MODERN ACCOUNTING APPROACHES TO CAPITAL MAINTENANCE AND VALUATION

By

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To my parents

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Abstract of Dissertation Presented to the Graduate Council of the University of Florida in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy

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The stimulus for this study was the belief that a thorough analysis of capital maintenance would offer valuable insights into the asset valuation problem. Capital maintenance was approached through the works of F. A. Hayek. We saw that a pure theory of capital maintenance entailed that capital be a subjective assessment of management. Two of the key characteristics of a suitable surrogate of subjectively valued capital are that it continuously captures expectations concerning the future, and that it measures the value of the asset in use. Hayek was quite sympathetic to the accountant's and tax official's expedient of employing historical cost to measure value, but he indicated that this expedient would be very poor under certain conditions--when there was an unexpected change in expectations.

As a prelude to part II of the study, where we examined several modern approaches to asset valuation, we examined

the conditions necessary for the very existence of a used asset market. We saw here that in what we called our "hard cases" that a used market for assets didn't exist. Our hard cases represent an extremely important segment of U.S. industry: the market for highly firm-specific plant assets. A good example of such assets would be the plant assets of firms in the photographic industry.

In part II we examined the approaches to asset valuation of Edwards and Bell, R. J. Chambers, the "Value to the Owner" School, and historical cost. We saw that Edwards and Bell employed market entry values (replacement cost) to value capital, but rather than proceed directly to a used entry value they choose instead to use the new asset entry value adjusted for estimated wear and tear. Edwards and Bell choose to adjust a new asset value because of their concern that in many cases a used asset value would be a scrap value. Edwards and Bell are perhaps at their weakest when they attempt to value assets that are no longer produced. Here they are forced to talk about index numbers and appraisals. Another theorist, F. K. Wright, has developed the notion of "equivalent services" which gives satisfactory results in the case where the asset in use is partially obsolete. But even his ideas suffer if the new asset renders services which are qualitatively different from the services of the outmoded asset.

Chambers, on the other hand, employs a used market price, the resale (or exit) price. While his system works

well for assets with a strong used market it deteriorates into a scrap value measure where the market is thin. Thus Chambers' scheme presents in many important cases a value which has no relation to value in use. The value to the owner valuation procedure consists of six decision rules that specify whether present value, replacement cost, or net realizable value ought to be used in a particular instance. We feel that the value to the owner valuation system best presents the value of the asset in use. We examined historical cost in a historical context so that we could determine why historical cost has been so extensively used for such a long time. We discovered that the reason for historical cost's popularity was not due to its inherent benefits but rather due to the practical difficulties in determining value: and our analysis of market values patently showed that market values are in many cases extremely difficult to determine--if not impossible. Finally the work of Yuji Ijiri was examined because Ijiri is regarded by many as the leading modern apologist for historical cost. We discovered that Ijiri predicates his regard for historical cost on its ability to offer a unique, certain measure of completed transactions and so be useful in custodial situations and for settling disputes. We agree with Ijiri, but we believe E&B's system can offer these benefits and more.

INTRODUCTION

The purpose of this dissertation is to examine some of the major theoretical models currently proposed in accounting. Our specific point of attack is to see how these models approach the capital maintenance problem and the asset valuation problem. Our underlying objective is to shed some light on the choice between these models. The dissertation is divided into two parts; part I deals with the capital maintenance problem and part II with the asset valuation problem. In the remainder of this introduction we will discuss each of the six chapters of the dissertation in turn. Part I is comprised of chapters 1 and 2 and part II the remaining four.

Chapter 1. In chapter 1 we develop Hayek's notion of capital maintenance which we use as our theoretical standard. We discover that Hayek's standard rests on a subjective view of capital by which we mean that the correctness of the capital measure cannot be ascertained until future events unfold. We further see that the distinction between a subjective and absolute (or objective) view of capital depends upon whether events can be classified as being foreseeable or not. Hayek himself suggests that in most instances the expedient of maintaining

intact an absolute amount of money capital is satisfactory.

After we develop the necessary background we examine how four leading accounting models approach the maintenance question: Edwards and Bell's (1965) replacement cost model; Chambers' (1966) exit value model; the current replacement value school's model, and the historical cost model. We see that with the exception of the current replacement value school's model all employ an absolute notion of capital maintenance. The distinction between an absolute notion of capital maintenance and one that is not turns on whether the underlying concept of capital is adjusted for changes in expectations.

Chapter 2. Chapter 2 is a prelude to the detailed analysis of the various accounting models in part II. In chapter 2 we discuss the possibility of approximating Hayek's subjective valuation ideal. We see that this question turns on whether a used asset market exists. You may ask, why a used market? We deal with a used asset market and not a new asset market because we are basically interested in the "value-in-use" of an asset. By focusing on a used market we avoid the pitfalls of comparing assets which, despite their similar functions, cannot be regarded as direct facsimiles in all respects but degree of use. The new asset may incorporate an important technological improvement which adds greatly to its usefulness and usually to its value. Where the new asset was a direct facsimile in all respects but degree

of use the market estimate of wear and tear will generally be inferior to the estimate made by the firm using the asset. The market estimate is an average of all types of different usage patterns whereas the firm in question knows exactly how it used this particular asset. In the direct facsimile case the only reason for employing a used market value instead of adjusting the new asset value for the appropriate degree of wear and tear would be the desire for some degree of objectivity.

For certain classes of assets no used market may exist whatsoever. We refer to this situation as our "hard cases" case. In order for any market to exist you need a demand for and a supply of the good or service required. In our "hard cases" case demand is nonexistent or so weak that no market price will be forthcoming. This situation can exist in a high technology oligopolistic market such as exists in the photographic industry. Here the factors which cause the market structure in the first place preclude (or all but preclude) the existence of a used market for the industry's specialized plant assets.

Chapter 3. In chapter 3 we deal with Edwards and Bell's (1965) accounting scheme paying particular attention to their valuation system. We start out by examining why they decided to develop an alternative accounting model to historical cost in the first place. Edwards and Bell explain that they wanted to provide a framework where actual events could be compared to expected events so that

management could learn from its errors. In particular they wanted to integrate significant economic changes into the accounting system (such as specific price changes) that are omitted under historical cost.

Edwards and Bell develop an accounting framework to accomplish their objectives that is quite complex. Two of its more interesting features are that it uses replacement costs (entry values) as its valuation base and that it divides income into two components. The first component is called operating income and represents the results of the firm's normal operating activities, while the second component measures the gains or losses due to simply holding assets over time.

After we present their accounting system we examine the topic we are chiefly concerned with, their valuation scheme. Edwards and Bell advocate replacement cost, as was previously noted, but instead of going to the used replacement market they recommend adjusting the price of an identical new asset for estimated wear and tear. Their aversion to a used market value seems to be linked with their general rejection of market resale values. We also examine how Edwards and Bell deal with the "thin market" case, the case where the market is very weak or nonexistent. In this situation Edwards and Bell recommend that replacement cost be estimated by index numbers or appraisals. We conclude our analysis by looking further at their holding gain versus operating gain dichotomy.

Chapter 4. In chapter 4 we discuss the accounting model formulated by R. J. Chambers (1966) paying particular attention to his valuation ideas. Chambers is unique among leading accounting theorists in that he has developed a wholly new basis for valuation--adaptability. Adaptability is the organizations's ability to change in the face of varying external conditions. A large measure of an organization's ability to adapt depends upon its knowing about its internal state of affairs.

Chambers' ideas have not been well received by accountants; the reason has not been so much a dissatisfaction with his adaptability idea per se, but rather with his valuation system which he argues follows from his adaptability thesis. In order to measure adaptability Chambers recommends that firms value their assets at their current resale prices (current cash equivalents) since a firm must know how much cash it would receive by selling its assets if the need arose. In other words, a firm needs cash in order to adapt to changing conditions in its environment.

A major problem with an exit value based accounting system is that very often the exit value deteriorates into a scrap value. This is particularly apt to happen where the market is very thin, and as Solomons (1971) notes, it makes little sense to value an asset at its scrap value when it is obviously worth so much more to the firm as part of its productive process. We have here the familiar disparity between value in use and value in exchange.

Our analysis in chapter 2 where we talk about the conditions necessary for the existence of a market largely supports Solomons' misgivings about exit values particularly where the market is weak. Where the market is not weak we find that there is perhaps a case for exit values; McKeown (1971) has shown that in at least one instance reasonable exit values exist for a company's assets. McKeown's test is rather a special case but it does point in the direction to where exit values may be profitably used.

Chapter 5. In chapter 5 we discuss the "value to the owner" (VO) approach to accounting valuation. This is an approach that is derived from the pragmatic rules formulated by Bonbright (1937) for determining indemnity values in insurance proceedings. Bonbright's rules briefly stated are that a person is indemnified (made whole again) if he can replace his lost asset. This sets the upper limit to the asset's value. At the other end of the scale the minimum that we could give him would be what he would receive if he could sell his asset.

We can express the value to the owner rule (VO) formally in terms of the relationship between replacement cost (RC), net realizable value (NRV), and the present value of future cash receipts (PV). The rule says that the value to the owner is the lower of replacement cost and netback, where netback is defined as the higher of net realizable value and present value. The most likely relationship for plant assets would be where PV > RC > NRV, that is where

the value of the asset in use, PV, is greater than either RC or NRV, while RC is greater than the exit (or liquidation) value--NRV. The most likely relationship for inventories would be where NRV > PV > RC, or perhaps even better where NRV = PV > RC. Here the sale price of the inventory asset would be very nearly equal to the present value of the future cash receipts and both of these values would be greater than the purchase price.

The value to the owner rule has not been without criticism, the main criticism being that it relys too heavily upon present values which are subjective. As we shall see in chapter 5 only in one of a possible six cases is an asset valued at its present value, and in this situation a subjective measure is what is wanted. Chambers (1971) criticizes the value to the owner rule on the grounds that it is irrelevant; firms seldom are deprived of their assets. Chambers' criticism could be applied against practically all market based valuations because none involve actual transactions except at the time of purchase and disposal. As we hinted at earlier the value to the owner rule is a pragmatic set of decision rules that arrive at a common sense value in most cases.

Chapter 6. In chapter 6 we conclude our analysis of various accounting valuation models by examining the model which is currently in use--historical cost. Our analysis follows the development of historical cost from the early days of the twentieth century when accountancy as a

profession was in its infancy to the present time. The first period from 1900 to 1940 sees American industry grow from small closely held companies to mature widely held corporations; another trend during this period was the increasing regulation of business by the government. In the early days of the century there was no firm commitment to historical cost, rather some accounting leaders advocated the use of value where it seemed appropriate. George O. May (1943) says that this early favorable attitude toward value was later changed not primarily because of the inflation of 1919 nor because of the depression of the early thirties but because basically market values were difficult to determine and harder still to interpret. His attitude is instructive in that it tends to support our thesis that the main obstacle to the inclusion of values into accounting is the difficulty of arriving at the appropriate numbers in the first place.

After the Second World War American industry (and industry everywhere) experienced a period of rapid and continual inflation, a phenomenon that has continued to the present day. With the onset of this steady inflation theorists and practitioners alike started looking for ways to meet the problem. The first suggestion was to adjust historical cost data by an index representing the change in the general price level. Although this idea was long contemplated by the accounting profession they only started to seriously act upon it in the early 1970's but by then

theorists and the SEC were demanding a full-fledged value based accounting system.

In the last part of chapter 6 we present the arguments for historical cost of Yuji Ijiri, considered by many to be the leading modern apologist for historical cost accounting. Ijiri claims that historical cost is much more practical than market measures because it is concerned with unique, completed transactions. Historical cost also does not suffer from multiplicity and stability problems as do market measures and it is additive where market measures are not. This practicality and certainty make historical cost uniquely suited to fulfil the custodial function of business. Ijiri believes that historical cost accounting provides an extremely valuable service to the community in that it helps resolve conflicts. He calls this activity equity accounting.

PART I

CAPITAL MAINTENANCE

CHAPTER 1
CAPITAL MAINTENANCE

The Pure Theory of Capital Maintenance: Informed Conduct

Capital maintenance is in its most fundamental sense a maxim for reasonable behavior; as Hayek (1935) puts it, we wish to maintain capital intact not because it is an end in and of itself but because of "consequences which are known to follow from a failure to do so" (p. 248). The consequences to which Hayek alludes are the unintentional impingements upon future income flows (as income is derived from a capital base). If we fail to maintain our stock of capital then our future ability to receive income is jeopardized.

The future income flows to which we refer can take on any conceivable time-shape. It is easy to imagine a producer desiring a time-shape that allowed more consumption now rather than later or vice versa. But, again following Hayek, for expositional purposes we will chose as a standard a constant permanent stream. It is the standard against which all others can be compared. One reason for our wanting the stream to be constant, and not erratic, is that while a producer may wish to enjoy a special, irregular, stream, the worker cannot. The worker receives his wage

because he cooperates with capital and, since he does not own the capital, he cannot express a preference about what the future time shape of income should be. And thus we "have to assume that he wants an income stream which does at least not decrease" (1935, p. 250). Besides being constant the income stream in our "normal" case is to be received in perpetuity. This assumption is purely a convenience; any arbitrary shorter time period could be chosen but while the argument would not change in principle it would be much more clumsy to work with. It should be noted that we refer above to a constant flow of income. The constancy is in terms of a given flow. Hayek's capital maintenance scheme allows for the constant flow to suddenly (and unexpectedly) change up or down to a different level, but no particular level of inflows is presumed permanent.

The difficulty with the notion of maintaining a constant amount of income can be well demonstrated by what we shall call the "cosmic cataclysm" case. Just suppose there is a city with say a very prosperous port, the port being the basis for the city's wealth. Suddenly, and most importantly, unexpectedly, the port is rendered useless, perhaps because some cosmic event has permanently shifted the tide. How are we to regard the city's future income prospects now that its capital base has been destroyed? If we defined income as a constant perpetual amount of money, then the unfortunate inhabitants of the city might never again have any--the meager receipts generated in the future, from

whatever sources, would be swallowed-up in replacing the lost capital base. The city would have to maintain a constant capital base in order to enjoy a constant amount of income. The city's populace could go on living, albeit more poorly, for perhaps hundreds of years, and yet, because of the maintenance of capital charge never again enjoy an income flow. Strictly speaking the city's populace should not consume anything, but rather channel all future receipts into building up a capital fund to the point where the fund generates a return (an amount) equal to their previous return from the port. Such a view makes nonsense of our everyday notion of income as the basis for consumption (and living) and cannot be seriously entertained.

Hayek (1935, 1969) also dealt with the case of an unexpected decline in capital. He suggested that a capitalist who faced such a situation has three options. The first option is to, as it were, ignore the decline in receipts incident to the capital decline and to consume as much as before if there are enough receipts. He would reduce the depreciation allowance (the capital maintenance allowance) so as to "finance" the present consumption. This reaction would have the effect, he says, of building up a sinking fund that will return a stream smaller than the one previously enjoyed. The second option available to the capitalist is to reduce consumption, as soon as the decline in receipts is seen, to the level "at which it could be permanently maintained" (1935, p. 261). The third

option available to the capitalist is to take the same action as did the city in our "cataclysm" example which is to continue to take the same depreciation allowances as before the change, reducing consumption "to what remains beyond this, if anything does remain. In this way it would be possible in many cases to recover the full capital value originally invested" (1935, p. 261). But Hayek continues, could this be properly regarded as maintaining capital constant?

> It would mean that the owner would have to reduce consumption for a period below the level at which it could be permanently maintained in order to increase it later above that level. It seems that this would have to be regarded in every sense as new savings savings it is true to make up for a loss, but for a loss which has already occured. This loss was irrevocably incured when the investment was made in ignorance of the impending change. (1935, p. 261)

Hayek's analysis is not quite as dramatically drawn as is our "cataclysm" example but the implications are the same. The third option, the "cataclysm" reaction could lead, if taken to the extreme, to <u>starvation</u>. It could literally take a lifetime of doing without any income merely to replace capital lost. The first option, that of consuming as much after the capital loss as before, could lead, if the loss was large enough, to the situation where all the capital was "eaten-up" leaving none for future income generation. This would be a live today, starve tomorrow situation. Options one and three in situations where the capital loss was large enough, would lead to

absurd results. Only option two does not offend against reason in the capital loss situation.

Hayek's analysis can be applied also to the capital gains case, the case where future receipts unexpectedly rise. Here the capitalist has some options as well. He can consume the extra receipts as they arise taking only the same depreciation allowance as before. This is option three. Under option one the capitalist would consume only the same as he always did allowing the extra receipts to accumulate, the sinking fund thus accumulated would return more than he experienced before the unexpected capital gain. This leaves option two, that of consuming only so much of the additional receipts such that from now on the capitalist could enjoy a higher constant return on his capital base.

The capital gains case is not as dramatic as the capital loss situation. The consequences of consuming all today are not nearly so dire as the opposite situation of consuming nothing today so that you can rebuild your lost capital. But Hayek is not interested in building up a theory of morally proper behavior, rather his ideas are designed to guide behavior. It is certainly possible to consume all of the extra receipts as they flow in; such an action is not generally considered unreasonable, nor imprudent. But at least Hayek's concept of income would signal the fortunate recipient of the capital gain that the extra consumption is not a permanent thing. The gain is due to completely

unexpected events which cannot be counted upon to occur again; indeed it is just as likely that the next unexpected event be a capital loss.

The key notion underlying Hayek's income concept is the possibility of discriminating between foreseen and unforeseen events, or those that are planned and unplanned. His definition of income is just a way of expressing this basic reality. This is Hayek's pure theory of capital maintenance (or income, for they come to the same thing). It is a theory of informed conduct, no more, no less.

Besides incorporating the distinction between foreseen and unforeseen events into his capital maintenance system Hayek also framed his system in terms of value--he rejected any physical notion of capital. Hayek's position contrasted with that of A. C. Pigou (1935, 1969) who advocated a physical notion of capital. Pigou pioneered the analytical development of capital theory and his ideas vacillated over time but by 1935 Pigou had incorporated into his theory the distinction between foreseen and unforeseen events: he excluded from capital maintenance events that sprang "from the act of God or the King's enemies" (1935, p. 240). Pigou had also by this time softened his ideas on the exact physical reproduction of discarded assets. He explains that if you discard an asset capital maintenance does not imply that you must reproduce the identical asset; rather, you take the quantity of resources that "would suffice in actual

conditions of technique to reproduce the discarded element" (1935, p. 239) and produce whatever asset that now gives you the best return.

Pigou's attempt to retain his physical concept of capital by employing a modified notion of reproduction is not without its difficulties. Perhaps it is impossible nowdays to reproduce the outmoded asset: technological change having advanced too far?

Pigou's next statement of his physical notion of capital comes in a 1941 article where he says:

> Capital consists at any moment of a definite inventory of physical things. What these are depends in part on how the general interplay of demand and supply has worked in the past. But, at any given moment they are constituted by an unambiguous physical collection. In order that capital may be kept intact, if any object embraced in this collection becomes worn out or is thrown out (scrapped), it must be replaced by 'equivalent' objects. (1969, p. 123)

In this new definition Pigou does not elaborate on what he means by "equivalent" objects but at least he allows for expected obsolescence as he allows for the replacement of scrapped assets. Yet on the very next page, in stressing once again the importance of physical maintenance, he directly contradicts his above definition. He says that capital maintenance is only concerned with actual physical changes and is not concerned with mere changes in value due to obsolescence:

> I accept too the view that, if maintaining capital intact has to be defined in such a way that capital need not be maintained intact even though every item in its physical inventory is unaltered, the concept is worthless. . . . we should try to define it in such a way that, when the physical inventory of goods in the capital stock is unaltered, capital is maintained intact. (1969, p. 124. Emphasis Pigou's)

Both Hayek (1969) and Hicks (1969) grasp upon Pigou's apparent rejection of obsolescence as a factor in capital maintenance and rightfully criticize his theory on this ground. Perhaps they should have, in fairness, pointed out that Pigou was somewhat ambivalent on the question of obsolescence but they chose not to. Pigou's difficulty with developing a completely unambiguous theory of capital maintenance based upon a physical notion of capital is instructive and we shall deal with this question again in part II where we investigate the approaches to capital valuation of various accounting theorists.

Pigou's above mentioned difficulty in developing a physical notion of capital and capital maintenance is a little easier to understand if we remember that he was mainly interested in developing a practical theory of capital accounting for use in aggregate economic accounts. Hayek, on the other hand, did not really attempt to develop a practical standard of capital maintenance, and this may be partly explained because he saw (correctly) that capital values depend upon individual expectations. He believed that there could be no objective standard of foresight because, "what is to be understood as maintaining capital

intact on the part of the individual entrepreneur or capitalist, is purely subjective, because it depends on the extent to which the individual capitalist foresees the future" (1935, p. 264). Hayek's use of "objective" is somewhat different than the use accountants' these days make of the term; when accountants use the term "objective" they mean that the number can be verified by an impartial third party--a market value is therefore objective in the accounting sense.

One reason for Hayek's failure to develop a practical standard based upon market values may have been that the accountants at the time that he wrote, in the mid- and late-1930's, employed a system of accounting based on historical cost. The annual depreciation charge based on a straight percentage of the original cost less estimated salvage was the practitioner's capital maintenance allowance. In commenting on these practical policies, Hayek (1969) said:

> I personally have come to the conclusion that while the ordinary practice of trying to keep the money value of capital constant is in most circumstances a fairly good approximation to the real purpose of capital accounting, this is not true in all circumstances. (p. 130. Emphasis added)

He went on to say that if this was an essentially negative conclusion, it was not therefore any less useful: "if the usefulness of the practices aiming at 'maintaining capital intact' have definite limitations, the important thing is that these limitations be recognized" (Hayek, 1969, pp. 130-131). In the final comment of his article in which he

touched upon the practical issue of capital maintenance Hayek throws out a challenge to accountants and tax officials to formulate practices that approximate the more theoretical theory he developed, saying:

> The problem which the accountant and the income tax inspector face is not what constitutes in any real sense 'maintaining capital intact' in these cases--although they may have to interpret legal provisions which use such or similar phrases--but what are the most appropriate practices which will achieve the same end, which in the more ordinary situations is adequately achieved by keeping the money value of capital constant. (Hayek, 1969, p. 131)

This dissertation is in fact an acceptance of this challenge. We plan to examine modern accounting approaches to income theory and capital maintenance in the light of Hayek's theory, keeping in mind all the while its practical limitations.

Some Problems with a Market Based Approach to Capital Maintenance

One way to improve upon income theory and the maintenance of capital is to incorporate some form of market valuation into asset measurement in place of historical cost. This is so because market values capture all the information known to the market. The current market price of an asset in use includes the effects of events unforeseen at the time that the asset was purchased. Thus if we employ market values we can attempt to isolate capital gains from income gains and so measure an asset's worth more appropriately--in terms of its future earning potential. I am going

to argue that the market prices that we are mainly interested in are used asset prices since we are concerned with assets actually in use, not with hypothetical or potential assets. If prices changed only at the end of an asset's physical life then most of our difficulties would be eliminated. The first problem we encounter in attempting to apply Hayek's income concept is that in many important cases used asset markets do not exist. This is particularly true of firm-specific plant assets such as custom-made machinery and large, technically advanced, immobile assets. We shall discuss the whole question of the existence of used asset markets in some detail in chapter 2.

Even if we have used asset values there is still the problem of isolating market declines due to unexpected events and market declines due to depreciation. This problem has been discussed by J. R. Hicks (1969) and an accounting theorist, R. J. Chambers (1966). Following Hicks, if we let C_0 be the value of capital stock at the beginning of the year, and C_1 the value of these same goods at the end of the year, then to determine depreciation by $C_0 - C_1$ is internally inconsistent. This inconsistency arises because the value of C_1 takes into account all the events of the year just passed, including unexpected events, which change C_1 to other then it would have been had only depreciation affected the beginning of year balance, C_0. Consistency requires that C_0 be adjusted so that the events of the year

just passed be incorporated into it too. Hick's expressed this new definition thus:

> Let us then define the depreciation of the original stock of capital as the difference between the total value of the goods comprising that original stock as it is at the end of the year (C_1) and the value (C_0') which would have been put upon the initial stock at the beginning of the year if the events of the year had been correctly foreseen, including among those events the capital value C_1 at the end of the year. (1969, p. 136. Emphasis Hicks')

Hicks felt that this method of estimating depreciation would be no harder to apply in a practical sense than any other method suggested for dealing with depreciation. It must be admitted that present day accounting methods are also estimates. But here the similarity ends. Hicks' method would require that each producer subjectively estimate the effects of the year's events on C_0; this is a great deal more subjective than the present-day approach of applying one of several depreciation formulas to the beginning book-value of the asset in question.

Chambers' approach to the depreciation problem requires, "An active secondhand market that will readily supply a resale price" (1966, p. 239). He starts his analysis by letting x_0 represent the unit resale price at t_0 of good X and x_1' represent the unit resale price at t_1 of X', the same good as X but in a different condition (it is one year older at t_1). Chambers divides changes in value into two classes, those due to specific asset price changes and those due to wear and tear (depreciation). He says that if there

has been no change in specific prices for a period then the change in the measurement of current cash equivalent (resale price) of the good is given by $x_o - x_1'$ and that this is a measure of depreciation (1966, p. 239). If the price of X changes during the period he says that the measure $x_o - x_1'$ is a mixture of both a change in its specific price and a change due to depreciation. Chambers goes on to say that one is able to isolate the effects of depreciation and unexpected events,[1] "only if it is possible to obtain at any time the present price of a good in the same condition as it was at the beginning of a period. It is not impossible to conceive such a price being available, but it is quite unlikely that such a price could be found in practice due to the difficulty of specifying the meaning of 'condition'" (1966, p. 242). Because of this difficulty Chambers avoids any attempt to separate specific price changes from changes due to depreciation. Thus Chambers also avoids any attempt to isolate declines in value due to wear and tear and declines in value due to obsolescence. He acknowledges the differences (1966, pp. 208-09, p. 242) between these two factors but says that it is not possible to separate them by reference to the market changes themselves. Chambers is rather quick to eliminate the possibility of subdividing income into causal parts, a part due to normal, or expected operations and a part due to unexpected events. The reason that Chambers is rather quick to eliminate the possibility of subdividing income,

which we shall investigate later when we discuss Chambers' accounting system in more detail, is that he places no great significance on income, seeing it merely as "the result of a calculation, an inference" (1965, p. 740). Chambers is much more concerned with presenting a statement of financial condition.

Accounting Approaches to Capital Maintenance

We are now in a position to see how modern accounting theorists have dealt with the capital maintenance problem. In this chapter we shall deal explicitly with the capital maintenance problem only, leaving our detailed analysis of the other aspects of their different accounting proposals to part II. We are treating the capital maintenance problem separately because not only does it allow us to concentrate on this important issue but also because it separates the discussion of the capital maintenance problem from discussion of the asset valuation problem. Shwayder (1969, p. 304) suggests that these two problems be separated, saying that if we can isolate and obtain agreement in one area we may perhaps simplify the remaining area of disagreement.

Four approaches to capital maintenance will be discussed: the historical cost approach; Chambers' approach; Edwards and Bell's (E&B's) approach, and the approach advocated by proponents of Current Replacement Value Accounting (CRVA).

At this point we shall introduce a simple numerical example that will form the basis for our comparison of the various approaches to capital maintenance. Our standard example besides presenting some basic facts will illustrate Hayek's pure theory of capital maintenance.

Assume we have a firm with two assets and no liabilities. It starts out its life at t_o with $2,000 worth of cash and a machine worth $2,000 (market value). Thus at t_o the firm's net assets (assets minus liabilities) are equal to $4,000 and the total equities are also $4,000.

Balance Sheet at t_o

Cash	$2,000	Capital Stock	$4,000
Machine	2,000		
	$4,000		$4,000

Let us further assume that the machine is expected to last for 10 years and have no salvage value. The only revenue that the firm receives is from renting-out the services of the machine for $500 cash per annum. There are no expenses except for the depreciation on the machine and at the end of the year any income is distributed as a cash dividend.

Now immediately after the machine is purchased some unforeseeable event occurs causing the market value of the machine to rise to $3,000 (it will still be useful for 10 years but the rental revenue will we assume rises to $750 per annum). Under Hayek's pure capital maintenance theory the asset account would be increased by $1,000 as soon as the unforeseen event occurred and a capital adjustment account would be similarly increased. The capital adjustment

account would be credited directly; the increase would not flow through an income summary account.

Balance Sheet immediately after adjustment

Cash	$2,000	Capital Stock	$4,000
Machine	3,000	Capital Adjustment	1,000
	$5,000		$5,000

Income for the year under Hayek's theoretical scheme would be $450: $750 revenue less the depreciation expense of $300 (one tenth of the adjusted asset balance of $3,000). Thus at t_1, after all transactions but before the dividend was distributed, the balance sheet would be:

Balance Sheet at t_1, before distributions

Cash		$2,750	Capital Stock	$4,000
Machine	$3,000		Capital Adjustment	1,000
Less	300	2,700	Retained Earnings	450
		$5,450		$5,450

After the $450 dividend distribution the balance sheet would be:

Balance Sheet at t_1, after distributions

Cash		$2,300	Capital Stock	$4,000
Machine	$3,000		Capital Adjustment	1,000
Less	300	2,700		
		$5,000		$5,000

Chambers' Approach to Capital Maintenance

Chambers defines income simply as the change in capital between two points in time. His definition of capital is "that part of assets of an entity over which its command is unrestricted by liabilities. The measurement of

the capital of an entity at a point of time is, thus, the current cash equivalent of all its assets less the current cash equivalent of its liabilities" (1966, p. 114). Chambers uses the expression current cash equivalent in preference to resale price or exit price.

It is useful to illustrate Chambers' approach to capital maintenance by way of our standard example introduced in the preceding section of this chapter. At t_o the firm begins its operations with two assets. We will assume that the current cash equivalent of the machine is $2,000 at t_o.

Balance Sheet at t_o

Cash	$2,000	Capital Stock	$4,000
Machine	$2,000		
	$4,000		$4,000

Under Chambers' scheme specific price changes are only entered into his system at the end of the year. Thus the $1,000 unforeseen price rise is ignored at t_o. At the end of the period (at t_1) the new current cash equivalent of the machine is entered as the balance of the machine account. Let us assume that at t_1 the new current cash equivalent is $2,700 ($3,000 less $300 depreciation) in line with our standard example. This means that the machine account must be increased by $700. Chambers treats this appreciation as an income gain:

Machine		Retained Earnings	
Balance, t_o	2,000		
Appreciation	700	700	Appreciation
Balance, t_1	2,700		

It should be noted at this time that we are assuming away all problems concerning the existence or strength of markets by assuming that markets are perfect. A perfect market is one where market participants have perfect knowledge of all relevant information. Thus all market participants will share identical knowledge about any good and so hold the same views about that good. The result of this common knowledge will be that only one price for the good will prevail throughout the market. Another feature of a perfect market is that there are no constaints on the free movement of goods into and out of the market. In other words there are no market "frictions" such as brokerage fees or transportation costs. This second feature of perfect markets is important because it allows only one price to exist for any good. If we take the case of a used plant asset, there will not be a market for selling the used asset and a separate market for buying the used asset. There will be only one used market and so the selling price (exit price) will always equal the buying price (replacement cost).

In all the numerical examples in this chapter we will see that the market price rises by $1,000 during the first year. This occurs despite the fact that we are dealing with Chambers' exit market or E&B's replacement market. Such uniformity is a result of the perfect market assumption; we will see that when we study imperfect (realistic) markets in part II that we get markedly different results.

As was indicated earlier, in the section where we discussed problems in applying market values to capital maintenance, Chambers regards the entire decline in market resale price as depreciation. In our example there is no decline in price; instead a rise is experienced, giving us an appreciation of $700 instead of depreciation. This strange result occurs because Chambers makes no effort to distinguish price declines from declines in value due to use. He doesn't try to distinguish between these two causes because he feels that it is virtually impossible to do it in a practical sense. Nor would he theoretically want to distinguish between the two causes. By the end of the year the firm has earned its $750 rental so that its cash increases by $750 and retained earnings also rises by $750. The balance sheet at t_1, before distributions, is now:

Balance Sheet at t_1, before distributions

Cash		$2,750	Capital Stock	$4,000
Machine	2,000		Retained Earnings	1,450
Plus	700	2,700		
		$5,450		$5,450

Chambers defines changes in the specific prices of assets as income changes, thus the entire $1,450 in retained earnings is income. We have assumed that all this will be distributed. The balance sheet at t_1, after distributions is now:

Balance Sheet at t_1, after distributions

Cash		$1,300	Capital Stock	$4,000
Machine	2,000			
Plus	700	2,700		
		$4,000		$4,000

Thus capital is maintained under Chambers' system if the amount of money represented by the beginning capital balance is kept intact. If all the income for a period is distributed in the period in which it is earned then the $4,000 capital balance will be kept constant from period to period.

It is clear that Chambers has an absolute capital maintenance system which gives quite different results from Hayek's pure capital maintenance system in situations where there are substantial capital (unforeseen) gains or losses. Absolute capital maintenance refers to the case where the initial capital "value" is maintained indefinitely despite unforeseen changes in the specific price of assets. Thus Chambers must maintain $4,000 every period before he can say he has earned any income. We will leave aside in this chapter any consideration of the affects of changes in the general level of prices. In our example Chambers arrives at a figure of $1,450 for income after applying his notion of capital maintenance, but Hayek arrives at an income figure of only $450.

Chambers' notion of income is different from Hayek's. Chambers sees income as the end product of a set of procedures, not as a guide for reasonable consumption. Although our example is rather simple, it shows that Chambers was only able to distribute the $1,450 income because of the large cash balance on hand. If the firm experienced a similar $1,000 unexpected capital gain in year two it would

still be able to distribute the entire year's income as a dividend. The balance in the cash account at the end of year two (before distributions) would be $2,300: the beginning balance of $1,300 plus the new, higher rental revenue of $1,000 (the $1,000 capital gain is in fact the present worth of the unexpected higher annual rentals; again for convenience we'll assume that the rental receipts rise $250). Thus at the end of year two the entire income ($1,000 capital gain plus $1,000 rental revenue) could be distributed as a dividend, leaving an ending cash balance of $300. But if the firm experienced a third capital gain in year three the beginning cash balance of $300 would not be enough to cover the capital gain of $1,000. It would be possible for Chambers to distribute the entire capital gain if we were to broaden our example to include borrowing. If borrowing were possible the owner would borrow the $1,000 capital gain. He could then repay the loan over, say, the next 4 years because we have assumed that receipts rise $250 per year for 4 years. However he would be forced to also pay an annual interest charge (let us say $100: 10 percent of $1,000). A result of the borrowing would be that future income flows would be slightly more irregular as income would be reduced in the years when interest was due.

A key notion behind Hayek's pure theory of capital is the presumption that events can be classified into those that can be foreseen and those that are unforeseen. It is

this quality that distinguishes income changes from capital changes. To be consistent with his approach of treating all gains and losses as income changes Chambers must reject the dichotomy that events can be divided into those that are foreseeable and those that are not. By and large Chambers does reject this dichotomy, mainly by regarding almost all events that affect a firm as expected. The only unexpected events he calls windfalls: "One's assets and residual equity [owners equity] may be increased by the receipt of legacies or gifts, and may be decreased by accidental loss or destruction of assets. To such involuntary effects we apply the term windfalls" (1966, p. 117. Emphasis added). He says further that: "We regard windfall gains and losses as gross increases and gross decreases respectively in the measure of residual equity due to fortuitous events, the incidence of which in time or magnitude could not have been evaluated in advance" (p. 119). Thus unexpected events are the result of gifts or accidents. Perhaps it would be better to refer to windfalls as unplanned, rather than unexpected, for in the case of accidents, though they be unwelcome, they surely are expected as it is possible to insure against the possibility of their occurrence.

Despite the fact that windfalls are unexpected Chambers still treats them as income although he does differentiate them from ordinary business income. He says that: "One's attitude towards windfall gains and losses

will differ from one's attitude towards discretionary income and expenditure. A man may feel free to dissipate a windfall gain in a manner quite different from the careful manner in which he plans to lay out his regular income" (1966, p. 117). The only time that Chambers suggests that income has an informative role is in his discussion of windfalls; although this discussion is not extensive, it does show that he is not oblivious to this informational role of income.

All other changes in resources, besides windfalls, are referred to as discretionary income and costs. Chambers defines them as "gross increases and gross decreases respectively in the measure of residual equity, the incidences of which are capable of being expected in advance" (1966, p. 119. Emphasis added). These other changes include the lion's share of events which affect the firm including changes in specific prices of assets. Thus to repeat our previous observation excluding windfalls: Chambers is, on the whole, consistent in treating the entire change in capital as an income change--a change which is expected.

Chambers formulated the rather pragmatic rule that all price changes be regarded as expected because he felt that it was impossible to verify after the fact whether a price change was foreseen or not. He saw that we would have to rely on the word of the producers themselves. We could make the procedure verifiable if producers were

required to state beforehand how they expected the prices of their assets to change, we could then divide the changes, after the fact, into those that were expected and those that were not. But while this procedure would solve the verifiability problem it would leave the determination of income completely to the subjective estimates of the producers. A hundred different producers faced with a similar situation would, most likely, come up with a hundred different estimates of future changes in prices and thus a hundred different income figures. Worse still, there would be no objective way of determining at the beginning of the period who had the best estimate. Thus each estimate would have to be regarded as reasonable when it came time to determine the unexpected price changes.

Thus in conclusion we feel that Chambers has formulated a capital maintenance rule that is internally consistent and deals with present prices rather than guessing at subjective values: all qualities which are to be desired. Chambers' accounting system cannot be rejected because of any great defects with his capital maintenance policy. Whether his system is acceptable or not depends on other factors, such as his valuation procedures.

Edwards and Bell on Capital Maintenance

Edwards and Bell (E&B) employ a concept of capital maintenance quite similar to Chambers in that it ignores

unexpected price changes. Income is the excess of the ending balance of capital (assets minus liabilities) over the beginning capital balance. Edwards and Bell define income, which they call business profit, as the excess that remains when the current cost of net assets is maintained (1965, p. 95). The first, and major, difference between E&B's income concept and Chambers' concept is that rather than use resale prices to value capital they use replacement prices (entry prices). Another difference concerns their respective approaches to depreciation. Chambers regards the decline in market value as depreciation when prices are stable, but E&B calculate depreciation on the average market value of the asset in question. The technique is much the same as used under historical cost--some appropriate rate is applied to this average balance.

Again we will illustrate E&B's approach to capital maintenance with the aid of our standard example. At t_o the machine is worth $2,000, and as we have perfect markets this is also the replacement cost of the asset. Thus the balance sheet at t_o is:

Balance Sheet at t_o

Cash	$2,000	Capital Stock	$4,000
Machine	$2,000		
	$4,000		$4,000

Edwards and Bell incorporated price changes into their system as a year-end adjustment. Thus at t_1 E&B would increase

the asset account by $1,000 and increase the retained earnings account by $1,000. Edwards and Bell use a more complicated procedure than this but the ultimate effect is the same; the capital gain is considered part of income.

Machine		Retained Earnings	
Balance t_0	2,000		
Appreciation	1,000	1,000	Appreciation
Balance t_1	3,000		

At the end of the year the $750 rent revenue will have been earned (and received). Edwards and Bell calculate depreciation on the average of the beginning and ending balance in the machine account. The depreciation charge would be one-tenth of $2,500 (the average of $2,000 and $3,000) or $250. Thus at the end of year the machine account would be reduced by $250, bringing it to $2,750. The balance sheet, before distributions, would now be:

Balance Sheet at t_1, before distributions

Cash	$2,750	Capital Stock	$4,000
Machine	2,750	Retained Earnings	1,500
	$5,500		$5,500

The entire $1,500 would be distributed as dividends since it is all regarded as income. Thus after distribution we would have a capital balance of $4,000. Again we have a procedure that maintains a constant, or absolute, amount of capital. The $4,000 would have to be maintained from period to period before income could be said to exist.

Like Chambers E&B don't try to distinguish between expected and unexpected gains and losses. This is somewhat unusual because the fundamental purpose for their accounting scheme is to aid in the evaluation of expectations. Accounting's task is the recording of "actual objective events as they occur" (Edwards, 1975, p. 238). Management compares these objective events with a statement of expectations and so evaluates the expectations. Part of the process of evaluation entails isolating the unexpected errors. Thus E&B could incorporate these after-the-fact errors into their accounting structure if they so desired; but they choose not to incorporate them.

Edwards and Bell do isolate price changes from operating income, however, referring to these price changes as holding gains and losses. But while the dichotomy is designed to aid the ultimate evaluation of expectations, holding gains and losses are still regarded as income. This dichotomy will be discussed in detail in chapter 3.

Edwards and Bell's maintenance procedure, like Chambers', is objective in that no subjective elements are directly incorporated into it (we will talk about the subjectiveness of their valuation scheme later). Also like Chambers' scheme, it is consistent with a maintenance procedure that ignores the distinction between expected and unexpected events.

The CRVA Approach to Capital Maintenance

Capital is maintained under the CRVA system only if the productive capacity of beginning capital is maintained intact. Productive capacity is defined as replacement cost. So far this is the same notion of capital maintenance as employed by E&B. Current Replacement Value Accounting differs from E&B's scheme in that, while a capital gain or loss was considered an income adjustment for E&B, it is not for CRVA. A capital gain under CRVA increases an asset account and increases a capital adjustment account, but does not increase income. Accounting bodies in many countries of the world advocate CRVA: the Dutch, Australians and the European Economic Community have implemented or proposed a CRVA system. Jan Klaassen (1976), a Dutch academician, says that under the CRVA capital maintenance rule: "The write up of a physical asset is a capital adjustment and not a part of profit, since this revaluation is needed to ensure the replacement of the assets (to be) consumed in the sold products" (p. 6). Likewise R. L. Mathews (1974), an Australian academic accountant, takes a similar view. Mathews wants unexpected asset price changes to be entered directly in an owners equity account rather than be flowed through the income statement. He feels that these unexpected price changes are more akin to capital contributions and withdrawals, and thus they should not be treated as distributable earnings. As Mathews puts it:

> In the current value system that will be described, the value of residual equity may change as a result of factors other than income flows associated with the productive activities of the business, for example because of capital gains or losses, specific and possibly, under one variant of the system, general price level changes. But these, like proprietorship capital contributions and withdrawals, are treated as capital adjustments or restatements of capital, rather than as positive or negative contributions to distributable income. (p. 51)

The balance sheet of our standard case would be the same as usual at t_o with the machine valued at replacement cost which we have assumed to be $2,000.

Balance Sheet at t_o

Cash	$2,000	Capital Stock	$4,000
Machine	2,000		
	$4,000		$4,000

The capital gain experienced immediately after the beginning of the year would be now treated as a capital adjustment and not as an income adjustment as was the case under Chambers and E&B. The machine account would be increased by $1,000 and a capital adjustment account would also be increased by a $1,000, viz:

	Machine	Capital Adjustment Account	
Balance t_o	2,000	1,000	Appreciation
Appreciation	1,000		

At the end of the year (at t_1) after all transactions have occured but before distributions the accounts would be thus:

Cash		Capital Stock	
Balance t_o	2,000		Balance t_o 4,000
Rent	750		
	2,750		

Machine			
Balance t_o	2,000	Depreciation	300
Appreciation	1,000		
	2,700		

Capital Adjustment			
		1,000	Appreciation

Retained Earnings			
Depreciation	300	750	Rent Revenues
		450	

The rent revenue would again be $750 and we will assume that depreciation is estimated at $300. Only $450 can be distributed as this is the income under CRVA. This would leave total assets of $5,000 (cash of $2,300 and the machine at $2,700). Thus we see in this simple example that we get the same capital maintenance rule as we got under Hayek's pure case. The CRVA theorists don't discuss whether they regard price increases as expected or not, but they do talk about whether price increases are distributable or not.

This notion of distributability is one of the key ideas underlying the CRVA system. Income is the amount that can be distributed as dividends. The CRVA conception of income approaches Hayek's notion that income is a signal that informs the producer as to what proportion of total receipts

he can or cannot consume. It is a rule that prevents producers from unintentionally impinging on their ability to consume in the future. The Dutch school of theoretical accounting acknowledges this informational aspect of income. Van Seventer (1975), alluding to Limperg, the father of Dutch accounting, says:

> The question that lies at the heart of the problem of income accounting involves the measurement of the size of the income flow. Limperg sees this as a primary informational requirement because the measurement of the income indicates how much can be consumed without encroaching upon the income source. (p. 72. Emphasis added)

The signalling function of income whereby imprudent consumption is avoided is not ruled out under E&B's scheme as information concerning holding gains and losses is accumulated separately from gains and losses from ordinary operations. Even under Chambers' accounting scheme holding gains and losses are accumulated but as depreciation allowances making them less accessible than under E&B's scheme.

The argument for treating a capital gain as a capital adjustment rather than an income adjustment is not symmetrically held for the capital loss case. Where an asset suffers a capital loss this loss is first charged against previous capital gains, but when the capital gains have been offset by capital losses any further losses are considered an income charge. Thus, the absolute minimum capital that is maintained under the Dutch CRVA system is the original purchase price. As van Seventer (1975) further explains:

> A fall of value below this minimum requires a contraction of consumption until the original investment is reconstituted out of subsequent transaction profits. Such reconstitution cannot be accomplished by a subsequent recovery in the value of capital assets. A rise in the asset valuation is, once again, an undistributable capital increase, inextricably linked with the productive capacity, and it is irrelevant from which price level the rise obtains. Any value decrease not offset by a previous increase acquires the character of an operational loss, and the historical capital value can be reestablished only by transactions income, not by holding "gains." (p. 76)

The Dutch theorists refer to this as the double minimum theory. There are two minimum amounts of capital that must be maintained: one for the capital gain case and another for the capital loss situation. In the capital gain case the minimum is the beginning of the period replacement cost of assets, whereas under the capital loss case it is the original purchase price (historical cost) of the assets. The capital loss minimum can equal the capital gain minimum but can never be larger and generally will be smaller. We will illustrate the capital loss situation by using our standard example. At t_1 the machine account and capital adjustment account stand as follows:

Machine

Balance t_0	2,000		
Appreciation	1,000	300	Depreciation (Wear and tear)
Balance t_1	2,700		

Capital Adjustment Account

		Appreciation	1,000

Now assume that immediately after the start of the second year the firm experiences an unexpected price decline of $1,500. This would mean that the asset account would be decreased by $1,500, the $1,000 credit balance in the capital adjustment account would be offset and retained earnings would be reduced by $500. Thus after the capital loss the machine, capital adjustment, and retained earnings accounts would show:

Machine			
Balance t_1	2,700 / 1,200	1,500	Price decline at t_1

Capital Adjustment Account			
Price decline t_1	1,000	1,000	Appreciation t_o

Retained Earnings	
Price decline t_1	500

The double standard implied by the theorem has been a controversial aspect of Dutch CRVA. The double minimum standard was proposed by Limperg and according to van Seventer the only justification Limperg offered for it was that a capital loss is just as real as an unprofitable operation. Limperg's "justification" has no logical basis. One could as easily argue that a capital gain was just as real as a profitable operation and so advocate that the capital gain too be treated as an income gain. But the use of an historical cost standard is not consonant with the rest of Limperg's ideas and van Seventer says: "Why it

should be allowed to substitute for the originally developed maintenance concept remains an unanswered question" (p. 77).

Current Replacement Value Accounting and the Continuity Concept

Under Hayek's capital maintenance scheme there is the presumption that so long as the capitalist maintains a given capital fund then he can expect to earn a given return on this fund. A necessary condition for the maintenance of the income return is thus the maintenance of the fund. The Dutch CRVA theorists regard continuance of the income flow as perhaps the main idea behind their accounting scheme. Rosenfield (1975) criticizes the CRVA approach to accounting because he believes their ideas concerning continuity are faulty.

Rosenfield says that CRVA theorists link continuity to survival; he then proceeds to attack this association. It is not difficult to show that survival is a broader concept than capital maintenance; survival entails meeting the obligations of creditors and the expectations of owners, things which are not necessarily implied by the simpler notion of capital maintenance. Rosenfield based his attack on an isolated quote by Barton (1975a) who is not generally regarded as a CRVA advocate. And while it is true that Barton mentions the words survival and productive capacity within one sentence, the discovery of this quotation does not necessarily mean that all, or even most, CRVA theorists would support the view that continuity is

synonymous with survival. Rosenfield has set up a straw-man: it is easy to demolish a straw-man, but such arguing is hardly convincing.

To sum up, the main difference between the CRVA approach to capital maintenance and the approaches of Chambers and E&B is that CRVA focuses on the distributability of income. Distributability is closely linked with Hayek's informational function of income. It should be noted, however, that the same information is available under E&B's capital maintenance scheme, but it is not presented in the same manner as under CRVA. Whether this is a real difference depends upon how financial statement users treat the income information. Current Replacement Value Accounting is also internally inconsistent in that it treats capital losses differently from capital gains.

Absolute Capital Maintenance: Historical Cost

Under the historical cost accounting system, which was until quite recently used almost exclusively, all asset "values" (or measures) are based upon their original purchase price. As these assets are used-up in the process of production they are charged against the period's revenues; the difference between the revenues and expenses being considered income. Some of these assets, such as inventories, are used-up (sold) relatively quickly; others, like machinery and buildings, may last for many years while some, like land, are not used-up at all. Capital

maintenance under the historical cost system means that income is not earned for a period until the historical cost of assets used-up in the productive process is recovered. Thus, if we assume that there were no capital contributions or withdrawals, income is only earned after the beginning of the period's assets, valued at historical cost, are kept constant. Or more accurately, since assets may come into the firm from debt sources as well as from revenue sources, income is only earned after the beginning balance of net assets (assets minus liabilities) is maintained. In terms of our standard example we would have the same $2,000 machine and $2,000's worth of cash at t_0. There would be no entry to adjust the accounts when the price of the asset rose to $3,000. The firm would still recognize the $750 cash inflow as rent revenue but depreciation would now be based on the asset's original cost ($2,000) and not on its adjusted cost of $3,000. Assuming that the straight-line depreciation method is used (with no salvage and a 10 year life) we would have a depreciation charge of $200. Thus the accounts at t_1, before distributions, would now be:

Cash			Retained Earnings			
Balance t_0	2,000		Depreciation	200	750	Rent
Rent	750				550	
	2,750					

Machine			Capital Stock		
Balance t_0	2,000	200	Depreciation		4,000 Balance t_0
	1,800				

As can be seen from the balance in the retained earnings account, income for the period is $550. This could be distributed leaving cash of $2,200, which together with the $1,800 balance in the machine account leaves $4,000 as the capital maintained.

Under the historical cost maintenance scheme an absolute amount is maintained--the original cost of net assets which in this case is $4,000. Actually we are maintaining the same absolute amount of capital, $4,000, as is maintained under both Chambers' and E&B's accounting schemes. But the difference between the historical cost maintenance scheme and that of Chambers and E&B is that under the historical cost scheme there is a smaller depreciation charge associated with a higher operating income as opposed to the oneshot capital gain and smaller operating income of Chambers and E&B.

Thus, in regard to capital maintenance, there is little difference between the market based measures of Chambers, E&B and historical cost. The main differences in their respective operating income and net income figures are due to the different asset values that they maintain. Thus any conclusive evaluation of these different schemes must be in terms of asset valuation.

Notes

1. It should be noted that not all price changes are to be regarded as unexpected. It is quite reasonable for some price changes to be expected. The effects of the expected price changes will obviously be taken into account at the time they are first seen, but the change itself will occur in the future.

CHAPTER 2
THE MARKET FOR USED PLANT ASSETS

It is our objective in this chapter to closely examine the market for used assets paying particular attention to the question of whether or not a used asset market even exists under certain circumstances. Basically the existence of a market depends upon the supply of and demand for a good or service. The characteristics of supply and demand are traditionally stated in terms of their similarity to the characteristics defining perfect competition. And according to the generally accepted view, perfect competition presupposes:

> 1. A homogeneous commodity supplied and demanded by a large number of persons, none of whom can influence price perceptibly by his actions alone.
>
> 2. Free entry into and out of the market and the absence of other restraints on the movement of prices and resources.
>
> 3. Perfect knowledge of all relevant information by the market participants.

These conditions are approximated in the real world by the market for grain. Here we have a fairly standard, or homogeneous product, and there are a large number of farmers supplying grain and millers demanding grain. The competitive process itself means that information is quickly and efficiently disseminated throughout the market. If, for

instance, a better strain of grain is developed, information about it will be quickly transmitted via the centralized commodities market. Similarly, changes in demand and supply are registered on the trading floor of the commodities exchange immediately as they become known. The nature of the commodity, grain, facilitates the existence of a centralized, very efficient trading area, the commodities exchange, and the outstanding characteristic of this centralized exchange is the way information can be rapidly disseminated throughout the market.

Imperfect competition, on the other hand, is characterized by conditions that are in several important respects the exact opposite to the situation described above for grain. We have a market with few sellers; in the limit we have a monopoly situation, but, more usually, an oligopoly. The other determining feature of imperfect competition is that entry into the market is very difficult. Usually entry would necessitate that you make an enormous capital investment, not only in terms of physical capital but also in terms of managerial expertise. Besides the initial capital outlay barrier, the producers already in the market would attempt to destroy your entry bid by engaging in some form of price-cutting, so forcing you to absorb early operating losses as well.

As far as the final output is concerned, while the products may not be exact duplicates as in the perfectly competitive case they may be close substitutes. The

differences between the products are due to largely artificial distinctions, for instance, consider the market for soap. Here the distinctions between one soap and the next are more due to skillful advertising than to any essential technical differences in the soaps themselves. It is true, though, that in some oligopolistic markets, for instance, the photography market, the final products are not entirely similar. The differences between the various photographic products often are due mainly to the priviledges granted by the patent laws.

Plant Assets of Oligopolistic Producers

We are interested in oligopolistic markets not because we want to analyze their final products but because we wish to examine their plant assets. Part of the reason for the very existence of the imperfectly competitive market in the first place is due to the barriers to entry of new competitors. And, as mentioned above, the main barriers are the enormous capital investment in plant and expertise required. It is these highly technical plant assets that we are really interested in.

Let's again take as an example the photographic industry. Many of the key plant assets of Polaroid or Kodak would be either self-manufactured or purchased on a special-order basis. Thus the demand for these assets would be perhaps limited to one or two buyers, and this is for the assets as new assets. It is doubtful that these specialized plant assets, when superseded by new equipment,

would have any used market value whatsoever, excepting for, possibly, a scrap market value.

The point we wish to make here is that there may exist no used market, or at the very most an extremely weak used market for firm-specific plant assets. Only where the plant assets are general-use and mobile will there even be the possibility of a used market.

The Exit Versus Entry Debate

Where a used asset market exists, and this will be the case for any nonspecific, mobile, generally used assets, there must exist both a selling market and a buying market. The existence of one implies the existence of the other. In a perfect market setting the selling or exit price will equal the buying or entry price. In this setting no broker is necessary, and the goods sold must be so easily transferred that transportation and removal costs are zero.

To the extent that the used asset market differs from a perfect market, the exit and entry prices will differ too. A broker becomes necessary and transportation become important. But even where these costs are considerable the essential differences between the exit and entry market are clear and predictable. There is no reason in principle why the entry price for the used asset could not be determined from the exit price: all that would be needed would be the average brokerage fees and removal costs.

Value in Use Versus Value in Exchange

Implicit in the discussion in chapter one and the discussion of asset values in this chapter is the notion that the value of an asset ultimately depends upon the future income flows (receipts less maintenance charge) that come from the asset. The flows, being future events, are necessarily subjective, but depending on the marketability of the asset we can attain some coalescing of subjective valuations. If the asset has a wide usefulness and is readily severable from the firm, then besides having a value in use, it will also have a value in exchange.

The similarity between the value in use and the value in exchange becomes rather ill-defined as the market becomes weaker (thinner). In the circumstances that we mentioned above, that is in the market for used highly technical plant assets, the market is very thin indeed. In these circumstances the exit value reduces to a scrap value and so no one would want to buy the asset. Needless to say the scrap value of a highly specific plant asset has little to do with its value in use.

PART II

ASSET VALUATION

CHAPTER 3
EDWARDS AND BELL

Reasons for Switch from Historical Cost

Edwards and Bell's (E&B) (1965) ideas on what accounting should be spring largely from their background as economists; they see accounting data as information needed by managers in their task of allocating resources so as to maximize some goal--usually profits. Since allocative decisions, and for that matter decisions of all kinds, are based upon expectations of the future, they reason that if management "can increase the relative accuracy of its expectations and the ability of the firm to act upon those expectations [then they should be able to] increase the profitability of the firm" (p. 2). The mechanism for increasing the relative accuracy of expectations lies in the comparison of these expectations with the actual events of a period. E&B see accounting's function as the measurement of actual events:

> The effective isolation of errors in expectations requires, of course, that the accounting data developed be directly comparable with the set of expectations originally specified. This means clearly that, insofar as possible, accounting data must measure the actual events of a particular period, no more and no less. Events of earlier periods must not be confused with events of the current period; nor must any events of the current period be ommitted. We shall find this

> criterion useful in evaluating the existing set of accounting principles. (1965, pp. 4-5)

Edwards and Bell's dissatisfaction with historical cost is based squarely on the fact that, in their opinion, historical cost does not measure the actual events of a period. They maintain, and we agree with their conclusions in this regard, that historical cost accounting would only "yield accurate and truthful results under very special circumstances" (p. 6). These circumstances would prevail only in a stationary state. Functionally, at least from the accounting standpoint, stationarity, implies: (1) a stable monetary unit, or in other words that the purchasing power of money be stable (2) that cost and market value are identical and that (3) the future be known with certainty. E&B suggest that rather than directly employing these heroic assumptions accountants instead have adopted certain conventions which "purposely restrict and circumscribe the scope and validity of accounting data as they are currently developed" (p. 9). These conventions are (1) the money convention, (2) the realization convention, and (3) the fiscal-period convention. The money convention restricts accounting to only those variables that can be measured in money. The realization convention means that profit is recognized primarily at the point of sale with no effort generally being spent trying to measure profit as it accrues in production or as it results from holding assets. The fiscal period convention is adopted to recognize the

tentativeness of so much of accounting, as is seen in arbitrary depreciation allocations and bad debt estimations.

Edwards and Bell next ask how far these conventions are from reality (p. 11)? Their answer is largely in terms of studies that indicate just how unstable prices have been, both in general and in particular. They conclude that attempts to modify historical cost which rely entirely on adjusting for changes in the general price level are defective because they ignore the effects that changes in specific prices have upon the firm.

Edwards and Bell's Accounting Framework

At the heart of E&B's accounting framework is the desire to approximate economic income as closely as possible while at the same time keeping the scheme thoroughly objective. Like most accounting theorists who grapple with the notion of income, E&B define economic income in terms of maintenance of capital. They say, "It is the amount that could be paid out as dividends in any period without impairing subjective value" (1965, p. 38). Economic income, as anticipated at the beginning of the year (called anticipated subjective profit by E&B), is the difference between the subjective value of the firm at the end of the year less the subjective value of the firm at the beginning of the year all measured at the beginning of the year. If we let V_0 represent the value of the firm at the beginning of the year and V_1 the value of the firm at the end of the

year, all measured at the beginning of the year, then, S_a, the anticipated subjective profit is defined as:

$$S_a = V_1 - V_o$$

We can find the past subjective profit for the year just ended by subtracting V_o from the value of the firm at the end of the year as measured at the end of the year, V_1', thus past subjective profit, S_p, is defined as:

$$S_p = V_1' - V_o$$

The difference between V_1' and V_1 reflects changes in expectations. But this difference, $S_p - S_a$, cannot be used to formulate V_1' itself for the procedure whereby $S_p - S_a$ is calculated already assumes we know V_1'. Edwards and Bell thus reject subjective income because it negates the very purpose of their accounting scheme: the improvement of expectations through the analysis of errors in past expectations. In place of subjective income E&B suggest an objective measure of income which they call realizable profit. Realizable profit is based upon market values and is the amount that a firm could pay out as dividends at the end of a period without impairing the market value of its assets. Realizable profit, based as it is on market values, is objective and thus enables deviations from expectations to be logically analyzed.

Realizable Profit. Edwards and Bell divide market values into two groups: entry values and exit values. Entry values are the prices that must be paid to acquire assets for the firm whereas exit values represent what the firm's

assets would bring if the firm sold them. Since the firm only sells a small percentage of its assets, exit values represent opportunity values rather than consummated sale prices for most assets. They state that: "The use of entry values as a basis of asset valuation implies that all assets should be valued at an entry basis until they actually leave the firm as a result of sale" (1965, p. 79). In this case no operating profit would be realized until the sale is consummated. This approach follows the conventional accounting philosophy of regarding the point of sale as the critical point in a firm's operations. The use of exit values, on the other hand, implies that operating profit is recognized "as soon as the exit value of assets at one stage of production exceeds the sum of the exit values of all inputs (whether raw material inputs or intermediate products) used in moving the asset from the preceding stage of production" (1965, pp. 79-80). If all stages of production are completed before the good passes to the customer then no operating profit will be related to the final sale of the good. The sale will merely represent an exchange of assets of equal value.

Edwards and Bell advocate that entry values be generally used to value a firm's assets but they do discuss the case where exit values would be appropriate. Edwards and Bell say that exit values are associated with a performance measure (realizable profit) that only tells you whether the firm has successfully covered "the short-run cost of operating the

business" (1965, p. 98). Entry values, on the other hand, are associated with a performance measure (current operating profit) which "indicates that the firm is making a positive long-run contribution to the economy" (E&B, 1965, p. 98). Edwards and Bell are interested in developing an accounting scheme that is useful for evaluating the firm as a going concern; they therefore recommend that replacement costs be used to value the firm's assets.

Current operating profit is predicated on the assumption that the firm is going to continue on in its present line of business. Where there has been a decision to abandon the firm's assets a reversion to realizable profit is called for. The decision to abandon the firm's assets would be forthcoming if the operating revenue of the firm were less than the current cost of generating that revenue; that is where the current operating profit was negative. In these circumstances, E&B say, "one must turn to opportunity costs to determine whether there is any short-run future for the production process being used" (1965, p. 103). Thus E&B allow for exit values where exit values are most appropriate: where the firm's current productive process needs to be abandoned.

Edward and Bell's use of the term operating profit stems from the distinction that they draw between production activities and holding activities. Production means the various activities involved in transforming one asset into another given that the transformation may only be spatial, whereas holding activities refer to the changes in value

that occur purely due to the passing of time (leaving aside certain "aging" activities associated with wine and cheese etc.). Edwards and Bell divide the fiscal interval into two components: production moments and holding moments. They regard, for purposes of argument, the production moment as an instantaneous event so that gains due to production can be distinguished from holding gains.

We are now able to define E&B's realizable operating profit since we have introduced their notions of realization and operation. Edwards and Bell define it "as the excess of the opportunity cost of the firm's total assets at the end of the production moment over the opportunity cost of the firm's total assets at the beginning of the production moment" (1965, p. 82). Any change in total assets that can be attributable only to the effects of price changes is considered a realizable capital gain (or holding gain).

Business profit. Edwards and Bell consider their concept of business profit to be "the accounting view of business operation" (1965, p. 88). Whereas realizable profit avoided any reference to a point of realization, business profit does not avoid reference. Under the business profit framework gains from production are not recognized until the point of sale. The emphasis is not on potential gains but rather on definite events which signal that a gain has been made. However under the business profit framework holding gains are still recognized at the

time they occur: they are therefore potential, or realizable, gains.

Present costs versus current costs. Edwards and Bell eliminate exit values as the preferred valuation base because, as they say:

> We believe that the primary function of accounting processes . . . is to provide data to aid in the evaluation of the existing mode of production. The decision which is being evaluated on the basis of accounting data is the decision which was actually made with respect to the composition of assets, not the possible alternatives relating to abandonment . . . of those assets. (1965, p. 275)

In the case of firm-specific assets exit values, which imply that the production process is to be abandoned, will have little or no relationship to value in use. Thus exit values cannot answer E&B's most important question: how have we used our existing productive assets? But after E&B have chosen entry value over exit value they must still consider which of two forms of entry value to choose.

The choice is between present cost and current cost. The present cost of an asset is the cost of currently acquiring the asset being valued, whereas the current cost is the cost of currently acquiring the inputs which the firm used to produce the asset being valued. Edwards and Bell (1965) reject present cost because:

> If the production process which created the asset is in current use by the firm, the use of present cost would imply the abandonment of the production facet of the realization convention. If the asset being valued is a good in process or a finished good, for example, the cost to purchase it from a competitive firm would presumably exceed the current

> cost of the asset. The valuation of the asset at present cost would therefore imply the recognition of some operating profit prior to final sale. (p. 91)

Edwards and Bell obviously have a point here regarding inventories. If inventories were valued at present costs the gain due to manufacture would be recognized at the time of manufacture and not at the point of sale. Where the present cost is lower than the current cost we have the agelong accounting dilemma of whether losses should be recognized at sale or earlier when they occur. Edwards and Bell stick to a strict interpretation of their realization ideal--they recommend that current costs still be used.

Edwards and Bell justify their preference for current cost, even when present cost has fallen below it, on two grounds. The first reason they give is that "present cost" is not a valid measure of the productive resources of the economy which the firm is actually using" (1965, p. 92). They feel, on the other hand, that current cost is a valid measure. We disagree with their reasoning here. Where it is cheaper to buy a good on the open market then to manufacture it yourself the valid measure of the resources used-up in an economic sense <u>is the present cost</u> of the good. The marginal cost of the good is the market price, this is the maximum amount of resources that should be expended to produce the good in question. In the case above where the firm is using more resources than the marginal producer to manufacture the good, it is <u>wasting</u> resources due, perhaps,

to inefficient production. In this case the extra resources used should be reported as an unfavorable efficiency variance, not as higher inventory costs.

The second reason E&B give for advocating current costs over present costs is that the exclusive use of present costs would circumvent the signal that the current production process ought to be abandoned. As E&B express it, "but if all assets were valued at present cost, this signal [that the current production process ought to be abandoned] would never be apparent" (1965, p. 92). Edwards and Bell's problem would be readily solved if both current cost and present cost could be used. Current cost would be used so long as it lay above present cost, but when present cost fell below it, present cost would be used. If this procedure were used the appropriate signal would not be lost. In the event that the firm's productive process becomes more expensive than its competitors then the firm's financial statements should report this fact. Such reporting would enable the analysis of deviations of actual events from expected events which E&B consider so vital (1965, p. 55). Edwards and Bell have strangely set up for themselves a false dilemma, there is no logical reason why present costs and current costs cannot be both employed. If both costs are used, then not only is the dilemma resolved, but we would get better reporting as well.

Decision Making Benefits Under E&B's Scheme

Edwards and Bell point out that their accounting scheme corrects some of the major defects of historical cost. Two major defects are the "neglect of realizable cost savings and the confusion of realized cost savings with operating profit" (1965, p. 222).

The omission of realizable cost savings from historical cost data entails certain implications for the evaluation of business decisions. The first implication is that holding activities are not ways that management can enhance the firm's market value. Historical cost data fails to inform management and external interested parties of the progress the firm made in this regard during the current period.

The second implication is that when holding gains are in fact realized the gains are attributed to the period in which the realization occured. It is not possible to allocate the gain over the entire span of time in which the gains in fact occurred. You can have the case where an asset is held say for 4 years over which time the asset's market value may have doubled. Under historical cost all the gain is shown as coming in the fourth year. But what if the asset's market value tripled in the first year and declined to its ultimate level over the next 3 years? Under the E&B's scheme only in year one would management be credited with making a wise holding decision, in the

next 3 years they would be shown to have lost money as a result of the holding decision.

A third implication is that present day historical cost statements, by omitting holding gains and losses data, make valid across company comparisons more hazardous. An outsider can only guess at holding activities; perhaps one firm has some hidden potential holding gains that another does not? Investors could make better decisions if they knew of these hidden holding gains. Edwards and Bell's accounting scheme would present this information.

The second major defect of present day historical cost statements, which E&B feel is the most damaging of all, is that holding gains are not identified as such under historical cost but are "included in what is called operating profit" (1965, p. 223).

Under the present historical cost system, since holding gains are ignored, depreciation is based only on the original purchase price of an asset--not on market value. Edwards and Bell present a scenario where a firm acquired some plant assets just before an unexpected rise in the price of these assets. In subsequent periods, under the historical cost system, this first firm would report higher operating income than its competitors who purchased the plant asset after the rise in its price. The inference one would draw from their respective income figures would be that the first firm was more efficient. But this would be wrong. The first firm was only wiser (or luckier) in the timing of its asset purchases.

Suppose that the first firm's operating efficiency actually declined. This decline would be possibly hidden for several years because of the offsetting lower depreciation charges. The result of such hidden information could be quite serious for external investors and for the economy as a whole. Precisely when the first firm should be finding it harder to acquire new capital, it may find it easier.

Should Holding Gains and Losses be Included in Income?

As we have just seen E&B regard the subdivision of income into a part due to current operations and a part due to holding activities as a vital aspect of their accounting scheme. In chapter 1 we saw that the ultimate role of income is to indicate how much of your income you can consume without impinging on your future ability to consume. Income was presented as a guide to reasonable behavior. We will now analyze E&B's accounting scheme to see whether his income figure is useful as a guide to reasonable behavior.

Let us first consider the income derived from inventories. We will demonstrate the inventory case by way of an example. Assume that we have a certain firm that buys and sells goods: a wholesale firm, for instance. Let us also assume that this firm must maintain a basic inventory level of two units if it is to trade effectively. Our firm begins business on t_o by buying one unit of good A for $10. It buys a second unit of good A on t_1, but this time it pays $12. Assume that on t_2 it sells the first unit of good A for $15. Also assume that there were no price changes for

good A Between t_1 and t_2. The income statement for the firm prepared in accordance with E&B's accounting scheme would be:

Income Statement for interval t_o - t_2

	Revenue.....	$15
less	Replacement cost of good sold....	12
	Current operating profit.....	3
plus	Holding gain.....	2
	Net income (or Business income)..	$ 5

Remember that at t_2 the firm has to replace the first unit of good A it just sold if it is to have two units on hand--its optimal inventory level.

The question to be asked now is, could the firm distribute the $5 net income? If we assume that the firm must replenish its inventory out of its operating revenues, which is normal capital maintenance practice, then the answer is no. For if the firm distributed the entire $5 net income this would leave only $10 cash to replenish inventory and a new unit of good A would now cost $12. Edwards and Bell's net income figure does not fulfil the primary role of income in this case--that of guiding behavior. In this instance if the entire $5 was distributed the firm would not be able to continue operating. Thus to repeat our conclusion; in the case of inventories E&B's income concept is likely to misinform statement users about the distributability of net income. Thus, in this particular case at least, their accounting scheme is not useful.

Edwards and Bell's accounting scheme definitely would be useful in the case of investment assets. Let us demonstrate this claim with another example. Assume that we have two companies, company 1 and company 2. At t_o company 1 buys investment asset X for $10 which it holds and sells later at t_1 for $20. It immediately takes the $20 and buys investment asset Y which also stands at $20 at t_1. Company 2 at t_o buys investment asset Y which then, like X, was selling at $10. Company 2 does not sell Y at t_1 but continues to hold it. Comparative income statements prepared under the historical cost accounting system would be:

Historical Cost Income Statements

	Company 1	Company 2
Revenues (realized gain)	$20	$ 0
Expenses (cost of asset sold)	-10	- 0
Net income	$10	$ 0

Whereas the comparative income statements prepared under E&B's scheme would be:

Replacement Cost Income Statements

	Company 1
Revenues (realized gain)	$20
Expenses (cost of asset sold)	-10
Net income	$10
	Company 2
Revenues (holding gain, appreciation)	$10
Expenses	- 0
Net income	$10

If the owners of company 2 rely on the historical cost income statement they will not know that they could sell asset Y for $20. It could be that they wish to maintain only a $10 investment and earn a normal return on this $10. If this were the case they could sell asset Y and buy, say, investment asset Z which we will assume is selling for $10 at t_1. They could then consume the $10 asset appreciation if they so desired.

The income statement prepared under the historical cost system is not informative in the case of investment assets, whereas the income statements prepared under E&B's accounting scheme are informative. A statement user would know about the possibility of realizing the $10 appreciation from E&B's replacement cost income statements. In the case of investment assets E&B's holding gain and loss concept is quite useful.

In concluding this section we are prompted to make the general statement that the usefulness of E&B's operating gain, holding gain dichotomy depends upon the type of asset under consideration. We have seen that in the case of inventory assets the inclusion of holding gains in net income could misinform statement users about the distributability of net income. We have also seen that in the case of investment assets that the inclusion of holding gains in net income provides valuable information to statement users which historical cost statements omit.

Edwards and Bell and the Valuation Issue

Before we can begin to analyze E&B's approach to valuation we need to first provide some background on economic obsolescence. Economic obsolescence is defined as the unexpected decline in an asset's value due to factors such as changes in taste and new inventions. In order to understand how value declines, one must first understand what gives an asset value. Assets are valued because of the services they perform; these services ultimately represent future cash flows. The value of an asset at any point in time is the present value of these future cash flows discounted back to the present at some appropriate interest rate. If these flows change, the value of the asset changes too. In this discussion we will assume a constant interest rate; one appropriate to the industry to which the firm belongs.

Until now we have been talking about cash flows and present values in a purely theoretical sense, but a market price is a reflection of the same sort of discounting process. Where the market is very strong the price represents the expectations of a vast number of people, or, to put it another way, the market price is based on a broad underlying subset of information. In our discussion we will assume that the market is strong and reacts quickly to new information.

If some unexpected event occurs that decreases the future expected receipts of an asset then the present value

of the asset falls which means that the asset's market price falls as well. This might occur, say, when a new machine is invented that is a close substitute for the machine now in use. The new machine produces the same product at the same rate, is expected to last for the same length of time, but has lower operating costs associated with it than the old machine. Assuming a competitive market and elastic demand, firms employing the new technologically superior asset would find it advantageous to expand their output by lowering their prices. Such price-cutting would continue till the firms employing the new asset earned a normal return on their capital. The industry price would thus be lower.

The upshot of all this for the firms employing the older asset would be that they would experience lower future cash flows, due to the lower product price, and thus the value of their assets would consequently decline. So long as the annual cash inflows from the old asset exceed the related annual cash outflows then it would be worthwhile for them to keep on using it. The old asset is said to be partially obsolete in this case. Total obsolescence occurs when the cash inflows are less than cash outflows, thus forcing immediate scrapping of the obsolete asset. In the case of partial obsolescence the old asset is used until it is physically worn-out; it is then replaced with the more efficient asset.

A good example of partial obsolescence is presented by Green and Sorter (1959). Their example is this: A firm owns a machine (asset A) which has a bookvalue of $5,000, "zero resale value, and a remaining life of 5 years. It is capable of producing 2,000 units of X each year with yearly input of materials and labor costing $1,500" (1959, p. 436). A new machine (asset B) enters upon the scene, it costs $5,000 has the same service life, 5 years, and also produces 2,000 units of X each year, but its yearly input cost is only $1,000.

Green and Sorter analyze the situation in two stages; in the first stage they ignore the time value of money, and in the second stage they introduce it. We will follow their lead and ignore the time value of money until later. Green and Sorter maintain that the introduction of the new machine (asset B), an event unseen when asset A was acquired, renders A partially obsolete. Arguing that:

> 1. If a firm owned neither asset, it would be willing to pay more for "B" than "A," but not more than a differential of $2,500 ($500 per year for 5 years).
>
> 2. As the firm already owns asset "A" it will not be replaced because the total savings of $2,500 are less than the $5,000 cost of replacing. (1959, p. 436)

Green and Sorter point out that present accounting technique (in 1959) would not recognize the obsolescence (nor does it in 1978). They propose that the carrying value of A <u>should</u> be reduced to recognize its inferiority to B. Suggesting that since asset A will necessitate that you

spend an extra $2,500 over the next 5 years then A's carrying value should be reduced by $2,500. In other words, if you now had to choose between A and B you would choose B if both cost $5,000, but if A's price were reduced to $2,500 then you would be indifferent between them. The way that they would effect the reduction in A's carrying value would be to debit prior years' income and credit the allowance for depreciation. The reduction in carrying value would obviously affect the depreciation charge each year. The straight-line annual depreciation expense (utilizing asset A) would now be $2,500 divided by 5 years or $500 per year rather than the $1,000 per year ($5,000 ÷ 5 years) that would have been taken if machine B hadn't appeared.

Green and Sorter's example can easily be refined one step further by taking into account the time value of money, but the principle is exactly the same. All that is changed is that the present value of the $500 annual cost savings (assuming a 6% interest rate) is $2,106, rather than $2,500 -- the present value assuming a zero interest rate.

Up till now we have been talking about the consumer goods producer, but the invention of a more efficient plant asset not only affects the consumer goods producer but also the producer of the outmoded plant asset. Whether the plant asset producer's productive process is rendered totally obsolete by the new invention depends upon the demand conditions he faces. It may be possible for firms

to buy the old outmoded plant asset at such a reduced price that they can use it and still earn a normal rate of return. Therefore whether the plant asset producer's productive process is rendered totally or partially obsolete depends upon whether he too can cover his variable costs.

It is possible to have partial obsolescence in both the consumer goods and producer goods industries, or partial obsolescence in the former and total obsolescence in the latter. But it is not possible to have total obsolescence in the consumer goods industry and partial obsolescence in the producer goods industry since there would be no market for the outmoded plant asset if there were no consumer market.

We have one more point to make concerning obsolescence before we discuss E&B's valuation scheme; it concerns the relationship between the price of a used asset and the price of an identical asset in a new condition. If we take the case where the outmoded plant asset is still produced in the face of the new invention, then the difference between the market price of the outmoded plant asset in a new condition and the market price of the outmoded plant asset in a used condition is due only to the wear and tear attendant upon production. Economic obsolescence affects both the new and the used asset and one can theoretically derive the price of the used asset from the price of an identical new asset. This is accomplished by subtracting an allowance for depreciation from the price of the new asset.

Edwards and Bell's Notion of Current Cost

Edwards and Bell view the current cost of a used fixed asset as the price of a new asset, of the identical type to the one possessed, reduced by an allowance for depreciation. They thus derive the used current cost of a fixed asset by working backwards from the price of the asset in a new condition. As E&B explain it:

> Some types of fixed assets are marketed continuously as new products and are subject to little technical change. The current purchase price of such assets new, at the end of a period, may be obtained in the same way as the current purchase price of raw materials, by a telephone call or by arrangement for a year-end statement from the selling company. And assuming the accuracy of the depreciation method used, the current cost of a used fixed asset can then be derived by taking depreciation on the new (current cost value) base. (1965, pp. 185-186)

This procedure for deriving used asset values seems quite unexceptionable; we saw above that the market price of a used asset was logically related to the market price of an identical new asset, all that was needed was an accurate determination of depreciation. One may wonder why E&B do not proceed directly to the used market instead or employing this roundabout procedure. The reason why E&B do not advocate using the purchase price of the used asset obtainable from a secondhand market is that they regard such a market price as an opportunity cost, a resale price, which they reject as the measure needed (pp. 286-87).

Edwards and Bell seem to miss the fact that the price of an asset is merely a reflection of the future cash

receipts which flow from the asset. Or, in other words, that an asset's value is the present value of future cash receipts. They state that (1965):

> External technological change will affect the firm's existing process of production by altering the relationships among those prices which govern the firm's behavior. As competitors adopt newer techniques, it is to be expected that the prices of the product sold by the firm will fall relative to the prices of its factors of production. (p. 285. Emphasis added)

Edwards and Bell seem to indicate here that whereas the price of the final product falls the price of the plant asset which produces the final product doesn't fall. They thus ignore the relationship between future cash receipts and asset value. Perhaps E&B meant that since the investment in fixed plant assets was already made then the cost of the overhead factor of production was fixed relative to the declining output price.

The error seems to have biased E&B against using secondhand prices to value used assets where the secondhand price is exactly what is wanted. Where technological progress has caused production of a plant asset to cease E&B allow the current cost of the used plant asset to be approximated by appraisals, index numbers and even opportunity costs.

Edwards and Bell use opportunity costs (exit values) when they believe that the asset is no longer useful to the productive process of the firm. Opportunity cost represents a scrap value, not a value in use. As E&B express it (1965):

> Finally there is probably no great harm done if the firm at this stage reverts to an opportunity

> cost basis for evaluation. . . . Even potential entrants to the industry could not be tempted to adopt the same plan of operation as that used by the existing firm simply because the necessary assets are not being produced. The potential entrant could secure such assets only in the second-hand market, and the prices prevailing there are the opportunity costs which the existing firm would be reporting. (pp. 286-87. Emphasis added)

Edwards and Bell are correct in supposing that the purchase price of the secondhand asset is closely connected with the selling price that the previous owner sold the asset for. We have indicated before that the main differences between the two prices lies in such factors as removal costs and brokerage fees, and where the market is strong and the asset mobile these differences would not be substantial. Also it would be an easy matter to rather accurately estimate one price from the knowledge of the other. Thus, assuming we had an active secondhand market, the difference between an entry value accounting system and an exit value accounting system would not be very great. It would appear that E&B had immobile assets in mind when they made the statement directly quoted above. Where we had an immobile asset with perhaps only a scrap market E&B's statement would not be all that far from reality.

Revsine on the Present Value Model

Our analysis of E&B's valuation scheme up till now has been based upon the presumption that the present value model of asset valuation is valid. Some call the present value model the rational expectations model as it presumes that the valuing process is a logical, rational activity: an asset (or investment) is valued because of the benefits

expected to flow from it; the discounting procedure is merely the vehicle for converting the future flows to a common basis.

Revsine (1970) calls the rational expectations model the indirect measurement hypothesis because rather than the price of an asset at the beginning of the i th period (P_i) being equal to the present value of future cash flows (V_i), as is true under perfect competition ($P_i = V_i$), we only have the price (P_i) approximating the present value of future cash flows (V_i) under imperfect competition ($P_i \cong V_i$). As Revsine (1970) puts it:

> Even in imperfectly competitive economies asset prices approximate the average net present value of asset revenue generating potential. Theoretically, changes in asset revenue generating potential precipitate appropriate changes in asset price. Proponents of the indirect measurement hypothesis apparently would contend that just as market price is related to asset net present value, so too the change in asset market price is related to the change in asset net present value. (p. 517. Emphasis Revsine's)

But, Revsine continues, "there are a priori grounds for questioning the validity of the posited relationship between changes in asset prices and changes in service potential in realistic economies" (p. 518). If Revsine's criticism is correct it throws into doubt our whole ability to analyze market prices in terms of the rational expectation (present value) model.

Revsine says that rather than asset prices changing in direct response to changes in the net cash flows expected to be generated by these assets there is "no necessary

relationship between movements in asset prices and movements in cash flows" (1970, p. 518. Emphasis Revsine's). Revsine sees three possible relationships between changes in asset prices and changes in future cash flows:

A. They can change in the same direction.

B. While the asset price changes future cash flows can remain constant.

C. Future cash flows can change in the opposite direction to changes in asset prices.

He labels these three possibilities as Type A, Type B, and Type C asset price changes. Revsine's discussion is concerned mainly with Type C price changes as they directly contradict the rational expectations model.

Revsine's example concerns the hypothetical gamma industry which produces a consumer good called a gamma. Now the industry is perfectly competitive but at the beginning of 19X0 it is out of equilibrium, with the industry earning an above normal rate of return. This situation obviously induces new firms to enter the industry and the resulting demand for plant assets in the gamma industry causes the price of these assets to rise. Revsine says that the final output of gamma goods won't immediately rise because of the lead-time needed to setup production. Thus, he says, "in this initial stage, no change in the magnitude of established gamma firms' cash flows occurs, but asset prices are bid upwards" (1970, p. 519).

After the necessary lead-time the supply of final output will increase in the gamma industry. Revsine assumes

a fixed demand schedule so that the increase in supply causes the price of gammas to fall. Further, Revsine assumes that the volume attained by new entrants is "garnered at the expense of established gamma industry firms" (p. 519). As a final assumption Revsine says that since the gamma industry is an increasing cost industry, "the increased output will trigger increases in the price of variable inputs used in production" (p. 519). Revsine concludes:

> The net effect of these events on the established firms in the industry will be: (1) a rise in the market price of capital assets used in production, and (2) a fall in expected future cash flows associated with operating the gamma producing equipment. Hence, a Type C price change (opposite movements in asset prices and future flows) is the likely result of this sequence of events. (p. 519)

Revsine even presents a short numerical example of the type of situation he envisages. At the beginning of 19X0 the gamma industry is in a state of temporary disequilibrium, the asset which produces the gamma (which has a three year life) is expected to generate annual cash flows of $110 for the next three years. Assuming a normal rate of return of 5 percent for the gamma industry the equilibrium price of the asset should be $299.55, the present value of $110 for three years discounted back at 5 percent. However the actual market price is only $250 due to the temporary disequilibrium. Thus the gamma industry is earning greater than a 5 percent return and this extra return attracts new entrants and so brings about the change of events that we described above.

Revsine's argument is wrong from the outset. His error stems from his notion of disequilibrium. In economics disequilibrium refers to the situation that results from a an unexpected change in events. At one moment a firm or industry is operating smoothly and then suddenly an unexpected change shifts the underlying relationships supporting the equilibrium. Such a change may result from a sudden shift in consumer tastes or the advent of a new productive process. Now in Revsine's example there is no unexpected change but the bald statement that the actual market price is $250 when it should be almost $300. The only way this could be explained would be in terms of a temporary irrationality on the part of the producer of the plant assets. All that would happen in this case would be that some of the firms in the industry who managed to purchase such an underpriced asset would experience a windfall gain; the value of the plant assets purchased before at the equilibrium market price would not fall. The most likely result would be that an arbitrager would buy up the underpriced assets and sell them later at a fair market value. Thus we conclude that Revsine's argument is fallacious and that the rational expectations model utilizing the discounting procedure is a valid approach to asset valuation.

A reasonable explanation for the sudden drop in the price of plant assets would be (assuming no drop in input prices) a falling-off of demand. In this situation the fall in asset prices (from $299.55 to $250) would be merely

the market adjustment to the initial fall in cash flows that are generated by the asset. The fall in cash flows would be the simple result of the leftward shift in the demand schedule. We have here a classic case of Revsine's Type A asset price change. Revsine's Type C asset price change is just contrary to economic logic.

Current Costs When the Market is Thin

Edwards and Bell suggest that where no new fixed asset of the same type as the firm employs is available then two means of measuring current costs are available: "(1) appraisal, and (2) the use of price index numbers for like fixed assets to adjust the original cost base to the level which would now have to be paid to purchase the asset in question" (1965, p. 186). Edwards and Bell offer little discussion of either of these two substitute measures. All they say about appraisals is that they ought to be carried out periodically by "independent experts" (p. 187). As for index numbers their discussion is limited to a few observations about which government departments compile "various price indexes" (p. 187). Because of the importance of market price surrogates a few observations concerning index numbers and appraisals are in order.

Indexes. The first observation is that indexes can only exist for a class of assets. Of necessity they must be averages and therefore suffer from the defects of any average--they may be unrepresentative of any given element that makes-up the class. A more serious problem is that

the price indexes are composed of new asset prices and thus represent "best technology" indexes. Edwards and Bell are concerned with estimating the current costs of outmoded assets, not the current costs of assets employing the latest technology. Wright (1965) criticizes E&B's use of index numbers where technical progress has occurred, saying: "Where substantial obsolescence has occurred . . . this suggestion [of employing price index numbers] seems very unsatisfactory. Consider, for instance, a propeller-driven aircraft which originally cost $2,000,000, but which would now be replaced by a jet aircraft costing $8,000,000" (p. 173). It's difficult to see how such an index based on the latest technology would be of much use in determining how much a new propeller-driven aircraft should cost, if only it were still produced?

What E&B are looking for is probably best described as a reproduction cost index. Quite apart from the difficulty of deriving such an index there is the question of its relevance. The difficulties of using a reproduction cost index were investigated by Livingstone (1967). Livingstone studied electric utility plant costs for the twenty year period 1945-1964. Using a well-known published reproduction cost index, the Handy-Whitman Index of Public Utility Construction Costs, he found that the reproduction cost of actual operating facilities approximately doubled over the twenty year period. But Livingstone notes:

> However, a replacement cost index (measuring the cost of productive capacity rather than productive facilities) specially computed for this purpose showed virtually no change for the 20 years. In other words, the greatly increased costs of reproduction of given facilities had been totally offset by technological progress and economies of scale due to larger plant sizes. This striking example highlights the potentially material error involved in using reproduction cost estimates instead of replacement cost estimates. (Largay and Livingstone, 1976, p. 221. Emphasis in original)

Appraisals. As Wright (1965) has correctly observed it is not much use specifying appraisal as a method of valuation, "without also specifying the principles to be followed in making that appraisal" (p. 173). The most familiar type of appraisal is that done by land or property appraisers. Largay and Livingstone (1976), who have developed a market value approach to accounting based on the work of E&B, discuss the problem of appraisal with the property appraiser in mind as model.

They discuss such problems as who should assume final responsibility for the appraisal? The appraiser or the certified public accountant (CPA)? They answer, and we concur with their judgement, that the appraisal must ultimately be the responsibility of the appraiser. Another question they deal with is whether the CPA should review the appraisal information. They point out that one important point that the CPA should be concerned with is whether the appraisal relates to the historical cost information presented. Clearly the appraisal must be related to the underlying physical assets of the firm.

Despite the fact that Largay and Livingstones' discussion of the responsibility of the appraiser and his relationship to the CPA is very interesting we feel that they have avoided the main issues concerning appraisals. An appraiser can offer his services in the market because of specific knowledge he possesses that others do not possess (they could acquire this knowledge but only at a considerable cost). The knowledge that is most valuable is knowledge of the local situation, or local conditions, and not knowledge of general principles. An outsider could not appraise property in a new community without first learning some specific information about the area. But what is true of property assets is not necessarily true of plant assets.

Is there an outside appraiser who could appraise the specialized equipment of, say, Eastman-Kodak or Polaroid? Their plant assets and markets are so complex that it is likely that only a few of their own executives could adequately appraise them. The knowledge necessary to determine the value of specialized assets associated with technologically advanced corporations such as Eastman-Kodak and Polaroid is probably restricted to a handful of people within each firm. In these circumstances we could still have appraisals but they of necessity would be the subjective internal appraisals of management.

Equivalent Services. Edwards in a 1975 reassessment of his and Bell's views on replacement costing confessed to

being "less than happy" (1975, p. 241) with their treatment of the case when current costs had to be approximated because identical assets were no longer produced. Edwards (1975) settled on another basis for appraising the current cost of obvious replacement, which he likened to the approach taken by the American Accounting Association's Committee on Concepts and Standards--Long-Lived Assets (1964). The Committee said:

> Where there is no established market for assets of like kind and condition, current cost may be estimated by reference to the purchase price of assets which provide equivalent service capacity. The purchase price of such substitute assets should be adjusted for differences in operating characteristics such as cost, capacity, and quality. (p. 695. Emphasis added)

We have here an attempt to derive a surrogate for a used asset. The key is to be able to come up with a measure of equivalent service. This may be a simple task as would be the case, say, when a new machine is available that is twice as productive as the old machine (keeping in mind that the older machine is no longer produced nor available secondhand). In this case the current cost of the old machine would be half the cost of the new machine less an allowance for depreciation.

Wright (1965) too grappled with the meaning of equivalent service. He asked what services are equivalent to a propeller-driven aircraft that flys 250 m.p.h. in an age of jets? Perhaps this question is unanswerable? He said, "Strictly speaking, in this case, no equivalent services

are available from new equipment. While this way of dealing with the question may be correct, it is not very helpful" (p. 177). Wright went on to suggest that we define a unit of output which is applicable to the new equipment and the old (for instance, passenger-miles, or ton-miles). Given this common unit of output we then estimate the difference in value per unit of output from the existing and new machines. Wright continues:

> Cost of equivalent output may then be defined as the cost of producing a similar output on a new machine, less any premium which this output enjoys over that produced on the existing machine. This now enables us to define cost of equivalent services as the cost of equivalent output from a new machine, less cost of inputs saved by not using the existing machine. (p. 177. Emphasis Wright's)

Wright's approach while theoretically attractive is practically very weak. It is almost wholly subjective in all but the simplest of cases. In situations where marked technological change has occurred there is the difficult problem of trying to equate plant assets that produce products that are qualitatively different. Returning to Wright's example, it is not really obvious that the modern jet would be a realistic competitor for the old outmoded propeller-driven aircraft. If they were not realistic competitors then the aircrafts could not be considered substitutes. If this were the case Wright would be valuing an asset with reference to a wholly different type of asset. One might as well value land by using the market price of automobiles.

Wright's notion of equivalent services would be more appropriate where there were no qualitative differences between the old and the new asset. Where the asset performed a purely mechanical function, like making moulds, then some sort of meaningful engineering comparison could be made.

Despite our reservations concerning Wright's index when technological change embodies qualitative changes, Wright's index is interesting because it is a "best technology" index. Edwards and Bell were careful to avoid one trap when discussing possible ways of approximating the replacement cost of outmoded assets; the trap entails the equating of a new, best technology asset with the old, outmoded asset. It is faulty reasoning to say that the replacement cost of the outmoded asset is the cost of the new, technologically advanced asset. Capital maintenance theory says that you should maintain the value of the assets you currently employ, not that you should maintain some hypothetical amount, which may be many times what you originally invested. Wright's index is interesting because he uses the best technology asset to approximate the value of the old, outmoded asset.

The key to Wright's index is that he attempts to reduce the old and the new asset to a common basis by introducing the notion of equivalent services. In the case of aircraft it might be passenger-miles or ton-miles. With this common unit of service he then estimates the difference in value per unit of service from the old and new aircraft.

Conceptually Wright's index is unexceptionable. To the extent that you can devise a common measure of output then you can use Wright's best technology index.

In conclusion, it seems to us that the task of defining the concept of equivalent services is in many cases fraught with difficulties. It could only be done in cases where the output of the new and old assets were very similar and where there were no qualitative differences between the old and new assets. Where substantial technological progress had occurred it could be highly subjective and perhaps even meaningless. The Committee on Long-Lived Assets recommended that: "Whenever there is no objective method of determining the current cost of obtaining the same or equivalent services, depreciated acquisition cost should continue as the basis of valuation" (1964, p. 695). We agree with their recommendation. Historical cost would seem preferable to an unverifiable, subjective evaluation.

Holding Versus Operating Activities

As we saw in the section on their accounting framework E&B emphasize the distinction between holding activities and operating activities. Operating profit is derived from the production process (although it is recognized only at the point of sale) whereas capital gains occur during the intervals between production. Theoretically holding gains and losses are not difficult to calculate; you simply take the difference in the price of the asset before and

after the change in prices. But E&B go one step further; they claim that the dichotomy is useful in evaluating two different types of decisions. Explaining that:

> These two kinds of gains [holding and operating] are often the result of quite different sets of decisions. . . . The difference between forces motivating the business firm to make profit by one means rather than by another and the difference between the events on which the two methods of making profit require that the two kinds of gains be carefully separated if the two types of decisions involved are to be meaningfully evaluated. (Drake and Dopuch, 1965, p. 195)

Edwards and Bell's dichotomy has not been universally accepted; Drake and Dopuch (1965) challenge the contention that E&B's mechanism for separating holding gains and losses from operating gains and losses correctly measures the relevant facts. They pose two situations where E&B's mechanism does not give unambiguous results. They show that some of the holding activity's costs are carried across to operating income and vice versa. The first situation involves an inventory investment decision. Suppose a firm has a normal inventory but because of an anticipated price rise decides to actively speculate and so holds more inventory than it needs to meet current needs. Drake and Dopuch first ask how the extra costs of holding the inventory, such as the extra storage, insurance and purchasing costs, would be treated under E&B's scheme. Holding gains and losses are calculated by simply subtracting the old price of inventory from the new price; this procedure thereby avoids introducing the extra holding <u>costs</u> (the costs of holding the above-normal inventory) into the

holding gain and loss calculation. These extra holding costs are lost in the normal operating costs of the business. Secondly, Drake and Dopuch ask whether the firm should report a holding gain on the normal inventory level since this amount is not held for speculative purposes. In fairness to E&B Drake and Dopuch do acknowledge that E&B's method of calculating an inventory holding gain or loss could be changed so as to accommodate their criticisms. In order to do this E&B would have to present a statement of normal expectations. But Drake and Dopuch question whether internal management would report its explicit expectations to external parties.

Drake and Dopuch's second situation where E&B's mechanism does not give unambiguous results involves the decision to invest in capital assets. They argue here that the decision to invest in capital involves factors that may effect both operating results and holding results. The situation they present involves the decision by U.S. Steel in 1952 to build the capital-intensive Fairless Steel Works. This decision was predicated on U.S. Steel's desire to gain future labor savings for they had anticipated rising labor rates. As it turned out they were correct in their anticipations; their capital-intensive plant later proved most economical. Drake and Dopuch ask how would this decision be reflected over the life of the asset under E&B's scheme? They suggest that initially U.S. Steel's operating income would suffer, relative to

less capital-intensive steel manufacturers, because of the larger depreciation charge; later on, however, when labor costs rose U.S. Steel would enjoy an advantage over its competitors because of its lower labor costs. They acknowledge that U.S. Steel would eventually experience a holding gain because the labor-input cost-increase would push the price of Steel up, assuming some price inelasticity in demand, thereby increasing the demand for the labor-saving plants. Thus the decision to invest in the capital-intensive process in the first place would not produce an unambiguous figure that would tell whether the speculative decision was wise or not. The gains and losses resulting from the decision would be intermixed in both the operating and holding income over the life of the investment.

One last point concerning holding gains and losses concerns the practicality of isolating perhaps thousands of extremely small price changes involved with any large inventory. There is a cost to Edwards and Bell's accounting procedures and in the case of large wholesale and retail firms the cost may be high. However, since Edwards and Bell recommend that the price changes be only determined at year-end most of the cost would already be covered when taking the annual physical inventory.

CHAPTER 4
EXIT VALUES: R. J. CHAMBERS

A New Basis for Valuation

Where historical cost has been abandoned in favor of value the usual rationale for choosing market value has been that market value achieves the dual purpose of being a close surrogate for the subjective valuations of the owners of the assets as well as being objective. Chambers is unique in that he advocates an entirely new rationale for market valuation--adaptability.

Chambers' valuation system is designed to fit into an accounting structure that will enable businessmen to make the best business decisions they can. The process of making business decisions Chambers describes as "optimal adaptation" (1966, p. 44). Optimal adaptation is the "preferred situation" towards which action is directed, and, as such, it gives the businessman the highest degree of satisfaction.

Chambers' notion of "optimal adaptation" is based on a theory of human behavior--homeostasis. The McGraw-Hill Encyclopedia of Science and Technology (1966) defines homeostasis as "the maintenance of internal constancy and the independence of the environment" (p. 468). The concept

of homeostasis was originally a theory formulated to explain certain biological processes: even today its main use is still in the biological sciences. The concept is best understood as the process that enables organisms to maintain a steady internal condition in the face of a changing external environment. If the external environment changes the organism can either alter a given property in the environment or can regulate its internal state. The best example of homeostasis on the biological level is probably the body's maintenance of a constant temperature. When the external environment is too hot or when the body generates excessive heat due to physical exertion, the body perspires and the skin's pores open in order to cool the skin and to expel the heat. On the other hand when the external environment is too cold the body shivers; the physical activity generates heat raising the body's temperature. In this way a steady bodily temperature is maintained.

One crucial element of a homeostatic system is the organism's ability to determine its present state or condition. In accounting terms, Chambers says that, a firm needs to know the "current cash equivalent" (1966, p. 92) of its assets. Current cash equivalent is Chambers' term for what is usually called the net realizable value or resale value of an article. Chambers chooses an exit price over an entry price because "the buying price, or replacement price, does not indicate capacity, on the basis of present holdings, to go into a market with cash for the

purpose of adapting oneself to contemporary conditions, whereas the selling price does" (1966, p. 92). The selling price, he says, is the measure that is "uniformly relevant at a point of time for all possible future actions" (p. 92). It should be noted, however, that Chambers' current cash equivalent measure is not relevant if you want to stay in the same type of business.

Decision Specific Arguments for Current Cash Equivalent

The most general question that an exit value system is supposed to answer better than other valuation systems is: "Should the entity continue on in its existing form or would it be better off in an alternative form? (Lee, 1975, p. 89). The user of the accounting data, it is argued, (particularly management) would find current cash equivalent data useful for the decision whether to liquidate and move into another business or stay in the present business. Bedford and McKeown (1972) present a similar argument in their analysis of net realizable (exit values). A function, they feel, that the measurement of assets serves is to present the financial position of the entity to the external user. Exit values, they say, tell the user what the firm's "generalized command over resources" (p. 334) is. The argument that the current cash equivalent of your assets tells you where you presently stand, thus enabling you to choose whether or not you should liquidate your present line of business and move into another, is not obvious to us.

Our first reservation concerns the appropriateness of the total amount of resources reported under Chambers' system. Chambers wants to derive the total current cash equivalent of the business by adding together the current cash equivalent of each asset, taken one at a time. But given that we wish to decide whether to stay in the present line of business or to go into another line of business it would seem that we would be vitally concerned with arriving at the maximum possible resources at our disposal. Chambers' current cash equivalent figure does not offer this.

It is not difficult to consider cases where we could receive much more by selling the assets of the business in various asset bundles rather than one at a time. Perhaps we could receive the greatest amount for our assets if we sold the business as a going concern? It is distressing, therefore, to discover that Chambers' current cash equivalent measure is simply one of many possible "liquidation" figures, and is not in any sense an optimum figure. On the contrary, it most likely would be one of the lowest of many possible figures. Thus, given the importance of the liquidate, do not liquidate decision, it is not clear at all that Chambers' current cash equivalent figure is really all that useful.

Bedford and McKeown develop their argument in terms of the financial position of an individual. The individual has a variety of wants and so needs to know "the amount of money which could be made available immediately to aid in

the satisfaction of wants" (p. 334). They then generalize their conclusions to the corporation, saying that, "while a corporation does not have human wants, it may be thought of as an extension of the stockholders' interest and therefore having objectives representative of a variety of human wants" (p. 334).

This method of extending the argument from the individual to the corporation is a common feature in the arguing of exit value proponents. Chambers himself uses the same method of development. Chapter 1 of his book, Accounting, Evaluation and Economic Behavior (1966), treats of the individual problem and from there he extends the argument to other business entities. Sterling (1975), too, presents his argument on a very simple, uncomplicated level that approaches the individual (as individual) situation. In a 1975 article he presented the case of a firm with only two types of assets: cash and securities. The only other asset in the economy was bread.

We believe that this technique of extrapolating from the individual to the corporation is a serious weakness. Because what is true in one sphere is, we feel, quite false in the other. The plausibility of the arguments for the individual (as individual) makes it difficult to adjust your reasoning to the different sphere--the corporation.

Another decision specific argument that is presented in support of exit values is that they are comparable. Lee (1975) says that advocates of current cash equivalent

argue that exit values "bring greater comparability of data from similar entities because the values are expressed in terms relevant to most businesses: the ability of cash to command other goods and services" (p. 90). The comparability argument is only true to the extent that two firms with the same assets would derive the same current cash equivalent measure. But we will argue later that it is likely that each firm will discover its own optimum pattern of selling assets (i.e., each will sell different asset bundles). Thus the total amount of current cash equivalent in each case is almost certainly going to be vastly different. In these circumstances we do not have comparability.

Criticisms of Current Cash Equivalent

Does it Measure Adaptability?

Chambers puts foreward the argument that in any accounting system measures should obey some fundamental axioms of measurement. The measure should have numerosity, that is, it should have the property of being quantifiable and should obey the rules of addition. Chambers states this property explicitly as follows:

> The measurements of such a property only conform with the rules of addition if it can be ascertained, by observation of experiment, that when $\underline{a}$ and $\underline{b}$ having property $\underline{p}$ are combined, the combination has the same property in the same measure as the sum of the individual measures of $\underline{a}$ and $\underline{b}$; that is $\underline{m}(\underline{a}) + \underline{m}(\underline{b}) = \underline{m}(\underline{a} + \underline{b})$. (1966, p. 90)

Larson and Schattke (1966) question whether Chambers' notion of current cash equivalent really obeys the above law.

They posit a situation where the current cash equivalent of an asset, X, is say, $10, while the current cash equivalent of another asset, Y, is say, $15, where each is sold separately. They suggest, however, that if X and Y were sold together then there would be a strong possibility that the total sales price would be greater than $25, the sum of X and Y sold separately. Larson and Schattke argue that it is not good enough simply that a measure be additive in only some combining operations, such as above where the assets are sold separately, but that additivity requires conformity with the axioms of measurement under all operations. Current cash equivalent as a measure of severable assets does not unambiguously measure the amount which a firm's assets may be sold for: thus it fails the additivity test.

We feel that Larson and Schattkes' criticism casts great doubt on Chambers' scheme. At the heart of his scheme is the notion of adaptation: Chambers', in fact, talks about optional adaptation. Optional adaptation means that you have reached that state, "the attainment of which would free [you] to seek other ends" (1966, p. 44). Although Chambers balks at the prospect of exactly specifying optimal adaptation (he admits that the concept "may appear to be lacking in precision" (1966, p. 44)), his use of the word optimal must mean that the measure is the best (i.e., gives the most cash) of all apparent possibilities. Thus the question of how the assets are disposed of, piece by

piece, or in groups, becomes critical. We feel that at any time there would be an enormous number of different selling combinations (only one of which is optimal) and that all, or all but one, of these combinations would violate his own additive rule. It should be noted that we are not talking about forced liquidations but about orderly sales. Chambers' measure is not additive in the best possible circumstances.

Can Current Cash Equivalents be Practically Obtained?

In Chapter 2 we showed a serious drawback to any value based accounting system was that in the "hard cases"; that is, when dealing with certain classes of plant assets, no used market price in fact existed. This, as has been suggested, is a serious flaw and perhaps a critical one for all value based accounting systems, but has a special pointedness for an exit value based system because it is always possible to create a used selling market where none exists. Such a market will be a scrap-value market and it is because of this possibility that most accounting theorists reject Chambers' system. Solomons (1971), for instance, says:

> The crucial test of the usefulness of exit values in accounting statements lies in the treatment of highly specific assets in a balance sheet. These assets may have very little value for anyone except the present owner for whom they were constructed. Certainly their market value may be much below cost. Yet, presumably, they were worth at least as much as they cost their owners when they were acquired, for otherwise they would not have been constructed or purchased. What sense would it make in accounting statements to

> write such assets down to their current resale value as soon as they were brought into use? The acquisition of these assets would have to be shown as involving their owners in a considerable loss of capital. This kind of accounting simply would not reflect the facts of the situation. Or at least it would reflect only one of the less important facts. (pp. 110-111)

It is because of the divergence between value-in-use and the exit (exchange) value that leads Solomons to advocate his "Value to Owner" approach to accounting valuation. Solomons' approach will be discussed in a later chapter. Barton (1975), like Solomons, also criticizes current cash equivalent as being unobtainable:

> Where physical assets are highly specific (either geographically or technologically), there may be no resale market for them as individual assets (although there may be still a market for the sale of the firm as a going concern) and their current realizable value may be negligible or even negative (where substantial disposal costs would be incurred). (p. 44)

Chambers is not oblivious to the possibility that some of a firm's assets will have no used market value. He talks about the problem as that involving nonvendible durables.

A durable asset is a fixed or plant asset and Chambers says that many firms "will aquire and hold some assets which are so highly specialized that there is no used goods market" (1966, p. 243). He says that this reduces the firms' adaptability and may in certain cases mean that there would be grounds for "assigning no current cash equivalent to them" (1966, p. 243). Chambers says that such an omission would have two effects. First, it would mean that some assets would be listed at their scrap value,

which might well be zero. This would lower, therefore, the amount of total assets and residual equity. Secondly, the rate of return on total assets would be affected; since the asset denominator would be lower for firms having the nonvendible assets. Chambers suggests, however, that a firm that had a higher return due to its possessing nonvendible assets would probably have some of this possible advantage offset by its lower degree of flexibility or adaptability.

Chambers doesn't close the discussion of nonvendible assets with the acknowledgement that they have no current cash equivalent: he suggests, rather, that his overall system be slightly modified so that approximations or surrogates to current cash equivalent be allowed. Two possible approaches to the problem of obtaining surrogates are presented: one is the use of indexed calculations and the other the use of replacement costs. Before we discuss Chambers' treatment of the two surrogates we would like to comment on the general propriety of his using these two surrogates in the first place. A surrogate is a substitute for another measure. The appropriateness of the surrogate depends upon the similarity of the original measure and the substitute. The original measure in this case, current cash equivalent, is a liquidation value while the surrogates, replacement cost and indexed calculations, are buying values. In a very large number of cases (especially in the case of firm-specific plant assets) these two values

would be totally unlike each other: the liquidation value near zero and the replacement cost perhaps many millions of dollars. In cases like these it is a misuse of words to talk about buying costs being substitutes for liquidation values.

As we saw above, when we discussed E&B's use of indexes, indexes are compiled by taking the average movement of new price numbers for a class of durable assets. Since we need an approximation to the price of used assets we must incorporate some measure of depreciation into the calculation. Chambers (1966, p. 245) suggests that some rate of depreciation be applied to the number derived by the index much as is done at present when some rate is applied to the beginning balance stated at historical cost.

The use of indexes is only necessary in situations where the market is thin, but in these circumstances it is not obvious that an index would be a better approximation to used values than would be historical cost. Let's suppose that the index of new fairly general-use assets rises because of changes in demand or in technology. In these circumstances the liquidation value of firm-specific assets would in many cases fall causing the index and the exit value to move in opposite directions. This would be the case where the change in technology rendered the old asset at least partially obsolete. Thus, in this case, we can say that indexed calculations would not be a good approximation to current cash equivalent.

Chambers is extremely vague on how replacement prices may be used to approximate current cash equivalents. He mentions that given replacement prices it would not be a difficult matter to come up with an index similar to the new asset price index discussed immediately above. Unfortunately he offers no further discussion; only the bald statement that it could be used as a surrogate.

The McKeown Test of Current Cash Equivalents

There has been one well reported empirical test of Chambers' ideas, that made by McKeown (1971). McKeown's test entailed taking a company's balance sheets for 2 years (1966 and 1967) and converting the accounts from historical cost to current cash equivalents. Although McKeown only identified his subject company as Company X its essential nature and character is easily discernable from the balance sheet accounts presented and from the miscellaneous discussion concerning the experiment. Company X is a medium-sized construction company that uses large pieces of equipment such as cranes, crawlers, wheel tractors, and graders (p. 19).

McKeown restated all balance sheet items, assets, liabilities and residual equity to their current cash equivalents but we will concentrate only on his treatment of plant assets as we have posited that it is in dealing with certain classes of these assets, the "hard cases," that Chambers' valuation scheme is deficient.

McKeown explained that he used three approaches to obtain current cash equivalents of plant assets. The first approach was to ascertain the used market prices for various pieces of equipment "from the reports of actual sales at auctions throughout the year 1967 and throughout the country as reported by the largest firm handling auctions of this type of equipment" (1971, pp. 20-21). The reports came from the Blue Book of Heavy Equipment Prices (1967). McKeown was able to obtain enough instances of used prices so as to be able to perform a multiple-regression analysis, "The dependent variable was, of course, the price for which the item of equipment was actually sold. The independent variables in most of the regressions were age, condition, list price new, list price of attachments, and month of sale" (1971, pp. 20-21). McKeown performed the regressions so that he could obtain a measure of dispersion for the assets value; he could then compare this measure with the measure of dispersion obtained under generally accepted accounting principles. The latter dispersion was computed by taking many different depreciation methods and computing the book value that would result from the use of each method. McKeown notes that "the dispersion of the measures obtained under these different generally accepted accounting principles was computed for each balance sheet date by computing the standard deviation of the book values at that date calculated under all acceptable depreciation methods" (1971, p.19).

McKeown's analysis did demonstrate that the current cash equivalent measures were more objective than the book values calculated under all acceptable depreciation methods. The criterion for objectivity was the measure of dispersion in each case. But we are mainly interested in the fact that McKeown could obtain so many actual used prices, which indicates a very strong market indeed. McKeown says that he obtained enough prices to run regressions on approximately 30 percent of the plant asset items accounting for about 55 percent of the plant asset value.

Where McKeown couldn't obtain enough market observations to perform a regression he relied on published average market values. He indicates that he used such sources as the Black Book (1967, 1968) for automobile prices, the Red Book (1967, 1968) for light trucks, and the Truck Blue Book (1967, 1968) for heavier trucks. All other assets were priced by referring to the Green Guide (1966, 1967, 1968). About 40 percent of items in number which accounted for about 38 percent of plant assets in value were valued by reference to these published market values.

The third method McKeown used to obtain used market prices for the plant assets of his subject company was to use Chambers' index method mentioned above. Briefly this method approximates the current cash equivalent of an asset by adjusting the asset's original cost by an index calculated from the new asset prices of the class of assets to which the specific asset belongs. The adjusted price

of the specific asset must be reduced by an allowance for depreciation to make it equivalent to a used value. This method was suggested by Chambers to be of use for non-vendible assets, but McKeown used it to obtain values "even though they do not fit the category 'nonvendible'" (p. 23). McKeown used this last method on about 30 percent of the items which accounted for about 10 percent of the total plant asset value.

Our main observation is that McKeown is dealing with a firm with exceptionally marketable assets. The items that had the strongest market were the large, valuable, and mobile construction equipment: cranes, crawlers, automobiles and trucks (these items are also highly mobile). All these assets are rather unique in that because of their mobility and general-usefulness they can be readily sold in a used condition and a market mechanism exists to facilitate this. It is interesting to note that a well organized used market doesn't exist for the less valuable items of equipment; apparently it is too costly to market these small items. However, according to McKeown these latter items are not nonvendible.

Thus McKeown's experiment is an experiment where one subject is observed. The subject in this instance is in an industry which is almost unique in that the majority of its plant assets are general-purpose and highly mobile. Whether McKeown picked the construction industry by chance or deliberately is difficult to tell, but McKeown himself

was not oblivious to the limited applicability of his conclusions:

> The conclusions stated above do not prove that the Chambers model is generally applicable in all situations. They indicate that the model was practical in this particular situation. The further statement could be made that the model would probably be applicable to companies similar to X Company. The one overriding general conclusion is that a large scale study should investigate a wider sample of companies (possibly over a longer period of time) to determine the extent of the situations in which the model is practical. (1971, p. 28)

The Effect of Current Cash Equivalent on Income

As we saw in chapter 1 Chambers regards depreciation as the decline in the current cash equivalent of a durable asset over the fiscal period. Thus Chambers avoids differentiating between declines in value due to wear and tear and price declines due to economic obsolescence. In the case of expensive plant assets for which there is no used market (except for a used scrap market) the decline in current cash equivalent in the first year of the asset's life would be practically the entire purchase price. Now unless the asset did suffer extreme economic obsolescence in the first year of its life Chambers' depreciation procedure would seriously overstate depreciation. As Barton (1975) points out, "In such a situation, the measure of periodic income is dominated by the firm's investment expenditures and does not necessarily measure the success of its operations for a period, while the measure of

financial position would gravely understate the current cost of the investment in its assets" (p. 44). The pattern of investment expenditures would thus have a large affect on operating income.

Chambers' approach to short-term inventories is similar to E&B's approach. Chambers regards the current cash equivalent of acquiring the inventory as the relevant market value. He states his views on inventories thus:

> As the risk of holding goods is not vacated until the point of sale, an approximation to the current cash equivalent of the short term inventory of a going concern is the current, price of the goods and services necessarily sacrified in acquiring such inventory. (1966, p. 265. Emphasis added)

Therefore Chambers as well as E&B regard replacement price as the relevant market value. Their approaches to inventories differ in that E&B employ a method that takes into account average purchase prices when calculating holding gains (1965, pp. 246-47) whereas Chambers takes into consideration the holding gain or loss only on ending inventory (1966, pp. 237-238). During a period of rapid price change the difference between their respective measures of holding gains could be substantial.

Chambers regards price adjustments on inventories as one of five categories of business costs; he enters these five categories into his income account (1966, p. 256):

Revenues: from sales of short term inventory
from sales of durables
Total revenues

Costs: (i) current cash equivalent, at time sale, of short-term inventories and durables

(ii) price adjustments to short-term inventories and durables

(iii) depreciation and obsolescence

(iv) purchase prices of services not assigned to short-term inventory

(v) capital maintenance adjustment
Total costs

Business Income: Total Revenues minus Total Costs

Windfalls:

Total Income: Business Income plus Windfalls

Subdivision (v), the capital maintenance adjustment, requires a few more words of explanation. Until this point we have defined capital as the current cash equivalent of net assets. This is not entirely accurate; Chambers is interested ultimately in the purchasing power of net assets. Under inflationary conditions when the general level of prices rises the purchasing power of the monetary unit falls. Thus the purchasing power of a given number of dollars (the current cash equivalent measure is in terms of so many dollars) at the end of a period after a rise in the general price level is less than the purchasing power of the same number of dollars at the beginning of the period. In order to maintain the purchasing power of net assets Chambers introduces a capital maintenance

adjustment whereby he increases the beginning value of net assets by the inflation rate. In this way the real purchasing power of the beginning capital balance is maintained.

An example may make Chambers' procedure clearer. Suppose the current cash equivalent of net assets at time t_o was $1,000 when the price level index was at 100. At the end of the period, because of inflation, it now takes $105 to buy what one could buy for $100 at the beginning of the period: the value of the dollar has declined. In order to maintain the purchasing power of the initial capital balance intact $105 must be on hand at the end of the period for every $100 of capital that existed at the beginning of the period. Thus $1,050 ($1,000 x 1.05) must be on hand at the end of the period to maintain the beginning capital of $1,000 intact.

Chambers effects this adjustment rather simply. He first calculates the increament by which the beginning capital must be increased (in our example .05 times $1,000 or $50); next he decreases income by this amount increasing a capital maintenance adjustment account simultaneously. Thus income is not earned until the purchasing power of the initial capital is maintained intact.

CHAPTER 5
VALUE TO THE OWNER

One of the early advocates of the "value to the owner" approach to asset valuation was David Solomons (1966, 1971). He was interested in formulating a valuation rule that approximated the theoretically sound but subjective net present value approach to valuation. Solomons saw a solution in the decision rules formulated by Bonbright (1937) for determining indemnity questions. Bonbright's rules said that if a person was deprived of an asset then he would be "made whole" again if he was able to replace the asset. Replacement value thus set the maximum amount the person could receive from the courts (plus any lost receipts and incidental expenses incurred during the waiting period).

Solomons suggested that the same type of logic could be applied to any valuation process--not just to indemnity proceedings. He reasoned that the value of an asset to its owner could not be more than the amount that would enable them to replace the asset. Nor could it be lower than what the owner could obtain by selling the asset. Thus the objective "value to the owner" rule has replacement cost as its upper limit and net realizable value (or resale value) as its lower limit.

Solomons' approach is very similar to that suggested by Wright (1973). Wright said that the "'value of the goods to the firm' [is]. . . . defined to mean the amount of cost or loss which the firm is able to avoid through having these goods. . . . [and is] measured by the minimum or unavoidable financial loss which disappearance of the article would cause to the firm" (1973, p. 260. Emphasis Wright's). Wright uses the term "minimum" here to mean "realistic" rather than lowest possible amount. Thus if the firm was using and planned to continue using the asset then the minimum loss would be the cost to replace, the asset, whereas if the firm had decided to scrap the asset then the minimum loss would only be the asset's net realizable value.

We can express the value to the owner rule (VO) formally in terms of the relationships between replacement cost (RC), net realizable value (NRV), and the present value of future net receipts (PV). The rule says that the value to the owner is the lower of replacement cost and netback, where netback is defined as the higher of net realizable value and present value. The term "netback" is taken from Stamp (1973, p. 566) and is introduced simply to make the definition of value to owner more intelligible, (It becomes difficult to talk lucidly about the lower of replacement cost and the higher of net realizable value and present value.) The value to the owner rule can be conveniently expressed in table form, as in Table 1.

Table 1

The Determination of Value to the Owner (VO)

Case where	Interrelationship	VO
Asset is used:		
1	PV > RC > NRV	RC
2	PV > NRV > RC	RC
3	RC > PV > NRV	PV
Asset is traded:		
4	NRV > PV > RC	RC
5	NRV > RC > PV	RC
Asset is scrapped:		
6	RC > NRV > PV	NRV

In the first three cases, (1), (2), and (3) we have the relationships between the three values that would most likely exist where the asset was held for use. Case (1) represents the case of the large specialized asset alluded to in chapter 2. The asset is very valuable to the firm using it but has little or no market resale value. The cost of replacing the asset would fall in between the PV and NRV. In this situation if the firm was deprived of the asset it could be returned to its former state if it were given sufficient money to replace the asset. Thus the value to the owner in this case is replacement cost. In case (2), where PV > NRV > RC, either the firm is overly optimistic about the asset and thus subjectively values the asset's services too highly or the firm knows something that the market doesn't. We cannot say for sure whether it would be better for the firm to simply trade in the asset or hold it for use.

It would depend upon the supply and demand conditions surrounding the asset. An example of case (2) was discussed by Wright (1971). Wright discusses the situation where the asset in question is "a segment of a wine merchant's stock" (1971, p. 61). The selling price of the wine is $800, and a similar batch could be purchased for $600. But if the wine merchant holds the wine for a prolonged period he can expect to sell it at a high enough price to yield a present value of $1,000 (thus PV > NRV > RC; ($1,000 > $800 > $600)). Wright goes on to say that whether the wine merchant holds the wine for investment or trades in it depends upon the relevant supply and demand curves, the availability of funds he has for investment, their cost, and so on. Wright continues:

> His best policy might be to devote all his resources to trading in the present, or to hold for aging as much wine as he can afford, or to divide his resources between trading at present prices and investment in aging wines. Only when we know what the optimal allocation of his resources would be, and how much wine he currently has in stock, can we determine whether the asset A should be sold at the current selling price, or held for future sale at a higher price. (1971, p. 61)

Wright says that regardless of the optimal decision, if the owner was suddenly deprived of the asset he could minimize his losses by immediately replacing the asset at a cost of $600. Thus the value to the owner is replacement cost in this case as it was in case (1).

Case (3), where RC > PV > NRV, represents the situation where the firm owns a large specialized asset that has been

rendered partially obsolete by either changes in demand or changes in technology. Ma (1976), refers to case (3) as "the typical locked-in asset" (p. 163) case. In case (3) the owner would continue using the asset till it had no further use, but if it were lost it would not be replaced. Thus the value to the owner in this case is present value.

The Sandilands Report Committee (the popular name for the British Government appointed Committee of Inquiry on Inflation Accounting (1975)) in discussing the value to owner approach to asset valuation considered case (1) as being the most likely of the six cases, saying: "Our own intuitive view is that. . . . [case (1)] is in practice the most common case, and may indeed be commoner than all the others put together (i.e. may have a probability of occurence of 50 percent or more)" (1975, p. 60). They also felt that case (3) was not all that likely (p. 60).

Cases (4) and (5) from table 1 refer to inventories--assets held for trade. The strict inequality NRV > PV in case (4) (NRV > PV > RC) is probably not as reasonable here as the equality, NRV = PV, would be. Generally the present value would be almost identical to the expected net realizable value; the effect of discounting in deriving the present value would be very slight indeed. Case (5) where NRV > RC > PV, would occur where the owner's subjective evaluation is less optimistic than the market's. In both cases, (4) and (5), if the owner were deprived of the asset he could minimize his losses by replacing the lost asset:

therefore the value to the owner is replacement cost. The valuation of inventories, because of the ready market values and of the closeness of present values to market values, causes little disagreement among accounting theorists. This general agreement over cases (4) and (5) is well echoed by Parker and Harcourt (1969) in their discussion of value to the owner. After asking rhetorically how useful the value to the owner decision rules are in practice, they answer that:

> There is little difficulty in the case of stocks of raw materials, work in progress and finished goods. Both raw materials and finished goods will usually have easily ascertainable replacement costs and net realizable values. The present value of the expected net cash receipts can be regarded for all practical purposes as equal to net realizable value. (1969, p. 18)

This leaves us with the last case, case (6) (RC > NRV > PV). This is an asset-in-use situation since RC > NRV. In this case, since the present value is below NRV the firm would be better off by simply disposing of the asset.

Ma's Criticisms

Value to the owner as a method of valuation has not been without its critics. The first criticisms we will discuss are those of Ronald Ma (1976). Ma finds fault firstly with Solomons' (1966) use of <u>differential</u> cash flows in discovering the present value of an asset. Ma considers that whereas differential cash flows may be used legitimately in "particular decision contexts" (p. 162),

such as capital budgeting, they cannot "serve as an accounting value measure, since the differential funds flow captures the entire synergistic effect from the joint use of the asset with other assets" (p. 162). Ma's criticism concerns the perennial problem that confronts all accounting and economic analysis--the problem of complementarity among assets.

Solomons is acutely aware of the complementarity problem, in fact it is the ability of the value to the owner rule to resolve the problem of complementarity that gives it so much appeal to him. He expresses this belief in a 1971 symposium by saying that:

> Fortunately, the upper limit to "value to the owner" set by replacement cost also enables us to resolve the difficult question of the relationship of the values of the parts of a complex business to the whole. The lack of one vital part of a machine could bring the whole machine to a standstill. Thus, the value of the part to the owner of the machine might be equated with the value of the whole machine. If we did this for each of several vital parts, we should finish up with an aggregate value for the machine equal to several times the value of the machine--a manifest absurdity. Fortunately, if each vital part can be replaced separately, its value to the owner will be limited to the cost of replaceing it, not the whole machine; and these several replacement costs will approximate in total to--they will not add up to--the value to the owner of the whole machine. (Solomons 1971, p. 112. Emphasis Solomons')

In an earlier article Solomons (1966) offers some concrete examples of what he means. What would happen, he asks, if a locomotive's wheels were suddenly "miraculously lost" (p. 123)? The owner would quickly "set about replacing them" (p. 123), he answers.

Given the problem of the jointness of production it is curious that Ma considers "the appropriate present value. . . . [as the] one given by the unique cash flow associated with the asset. . . . and not the differential flow which captures the entire synergistic effects from employing the asset jointly with other assets (including human resources) in the firm" (1976, p. 164). You cannot really talk about any asset producing unique cash flows; every asset is valuable only because it is used in the context of an economic organization--the firm. Even inventories depend upon the economic organization to give them value. Ma himself appreciates this for he says that, "Unfortunately it is not possible to identify or even conceive of the unique cash flows generated by individual assets" (p. 164). Ma's strategy, it seems, has been to dismiss value to the owner on the grounds that it employs the concept of present value which he feels cannot be defined. Ma in particular is critical of case (3) where RC > PV > NRV. In this case the value to the owner is the present value of the asset. No one, least of all Solomons, would deny that present value is a purely subjective value. But where an asset has suffered partial obsolescence (as in case (3)) the logical value to the owner does fall between its scrap value and the cost to replace it, and here some sort of subjective assessment would be the best reflection of value. We don't feel that Ma's criticisms are overwhelming. Present value, seen correctly as a

differential flow, is subjective. Ma's arguments that present value must be derived from the unique cash flows associated with an asset are specious and besides the point. In case (3) we are forced to choose a subjective assessment of value, but at least we can place limits upon the subjective evaluation. Thus to repeat our conclusion: we feel that Ma has attacked Solomons' notion of differential cash flows on the mistaken idea that somehow Solomons has gotten round the subjective problem associated with present values. Nothing could be further from the truth. Solomons advocates value to the owner because it avoids present value in most cases; only in the case of partial obsolescence is he forced to fall back on it. Rather than bypass this situation Solomons incorporates it into his list of decision rules.

Ma's second criticism of the value to the owner approach to asset valuation concerns possible swings from case (1), where PV > RC > NRV, to case (3) where RC > PV > NRV. Ma questions the usefulness of a valuation rule that might be very volatile. He says that there could be a "yo-yo effect" (p. 163) as reports of business upturns and downturns cause managements' valuations to go from case (3) to case (1) and back to case (3). Our reaction to Ma's criticism is that volatility is not necessarily a defect if it reflects the actual business climate. But to have a swing from case (1) to case (3) we would need more than just a shift in business enthusiasm. Generally the present

value would far exceed the replacement cost so that a shift from (1) to case (3) would have to represent an unexpected turn of events against the firm; the sort of events that render an asset obsolete (or at least partially so).

Chambers' Criticism

Chambers is critical of the value to the owner approach to asset valuation on two counts; first, he argues that the notion does not deal adequately with the accountants' valuation problem, and second he argues that it is too subjective. Chambers' first criticism revolves around the contention that deprival is not really relevant to the accountant because firms rarely are deprived of their assets. As Chambers (1971) puts it:

> But is theloss of assets such a commonplace event in the affairs of firms that every balance sheet of every company should contain asset values based on the condition: 'if the owner were to be deprived of the property'? Losses by fire, tempest, resumption and so on are very rare incidents in the lives of particular firms (other than insurers, of course). The extent of the loss on (hypothetical) deprival seems, therefore to be a strange and strained basis for asset valuation for accounting purposes. (1971, pp. 68-69)

Another aspect of the same sort of criticism occurs in Chambers' criticism of Wright's (1967) notion of opportunity value. Wright regards his notion of opportunity value as synonymous with value to the owner and defines it as "the cost, loss or sacrifice which the firm would have to incur if it did not already own that asset; it is measured by the

least costly of the alternatives avoided through owning the asset" (p. 76). Chambers adds to Wright's definition the assumption that the firm must wish to put itself in the position of having the same prospect (1971, p. 67). This assumption is added because Chambers regards the ability and the opportunity to adapt to new circumstances (which includes the ability to be able to switch industries if necessary) as the most critical factor in commercial life. The specific instance of Chambers' criticism concerns case (1) where PV > RC > NRV. Chambers, referring to an earlier example of his (1970, p. 46), lets an asset A have a resale value of $800, have a replacement cost of $1,000, and have a present value (if held) of $1,200. Following the value to the owner decision rules the asset would be valued at $1,000, the asset's replacement cost, since, if the asset were lost, $1,000 would be the lowest cost of regaining the $1,200 prospect. Chambers asks what would happen if there existed a prospect B that cost $800 and had a present value greater than $1,200? In this situation the rational course of action would be to sell asset A and buy asset B, that is, switch products, and perhaps industries, and engage in the new trade. The value to the owner rules (nor for that matter Edwards and Bell's (1965) replacement cost maxims) do not preclude an owner from switching products or industries where appropriate. There is the presumption, however, that generally it will be far more beneficial to remain in the present activity.

Chambers' criticism suffers from the same implicit assumption that underlies all his work: that generally a firm can and does want to switch out of its present occupation into another. This is an assumption that is almost universally rejected, and we concur with this rejection.

As a minor part of his irrelevancy (first) criticism Chambers says that, in any case, if a firm were deprived of an asset, the least costly way of having the same prospect "is the lower of its replacement price and the price of some other course of action which is expected to give the same prospect" (1971, p. 67). Since the firm does not now possess the asset it cannot, therefore, sell it. Thus the asset's net realizable value is not a feasible alternative in the value to the owner valuation rule. Chambers' argument is not even superficially convincing. The problem he refers to is common to all valuation schemes. All valuation schemes that rely on market prices do not require that the assets valued be actually exchanged on the market, rather an inference is made as to what an asset might cost, or might sell for. The same sort of supposition lies behind the value to the owner valuation scheme. The question is asked, what would we accept if we were suddenly deprived of this asset? The valuation scheme is no less valuable in situations where there is no loss of assets.

Chambers' second criticism concerns the inclusion of present value itself into the valuation process. As Chambers has it: "as value to the owner is specific to,

assessable by, and strictly an opinion of the owner, it can have no significance as financial fact to investors or creditors" (1971, p. 72). Admittedly the value to the owner valuation scheme does explicitly introduce present value into its valuation rules (and in case (3) actually values the asset at present value), but present value underlies all market valuation models, whether acknowledged or not. Edwards and Bell's (1965) replacement cost valuation scheme explicitly assumes that the firm will continue on in its present activities, implying that the firm's assets are at least worth the cost of replacement. Even Chambers' (1966) scheme assumes that the assets can be disposed of in an orderly manner over time, again implying that the firm continues on in its present activity. The implicit assumption here too is that the firm's assets are worth more to the firm than their resale value.

CHAPTER 6
HISTORICAL COST

Cost versus Value: the debate till 1940

Accounting writers were much more ready in the early days of the twentieth century to recognize market values than their successors were 30 years later. From the depression of 1893 there had been a steady increase in prices, which averaged about 2 percent per annum from 1896 to 1913. In addition to the steady inflation, which was unprecedented in U.S. business history, the American corporation also was undergoing a remarkable period of change. About this time corporations were changing from organizations with limited liability, owned and managed by a relatively small group of stockholders, to organizations "owned by relatively large numbers of stockholders, the management of which was divorced from beneficial ownership and the securities of which were bought and sold freely on established markets" (May, 1943, p. 51). May notes that in 1897 "only thirty-seven industrial stocks were listed on the New York Stock Exchange" (p. 51). In this atmosphere of growth and change it should not surprise us that American accounting writers were ready to lay aside cost where appropriate. In 1913, for instance, A. Lowes Dickinson, perhaps the leading accounting figure of the time, said:

> It is necessary to recognize that there are causes at work, particularly in young and growing communities, which may render a statement prepared on the basis of cost of capital assets misleading and even prejudicial to the proper interests of present owners. (May, 1943, p. 91)

Paton (1976) and Hatfield (1971) also were early advocates of value accounting. In a 1918 article Paton saw the function of accounting as that of reporting economic values which he equated with present values. He argued that original cost should only be shown on financial statements when prices were stable, and that changes in specific prices rather than changes in the general price level should be reflected in the accounts. Paton, with the interests of management in mind, even advocated that changes in replacement cost be credited to revenue; a suggestion later advocated by Edwards and Bell. Strangely enough Paton greatly toned-down his confident endorsement of value just two years later in a 1920 article; apparently the inflation and economic uncertainty of 1919-20 caused him to take a more conservative stand.

In contrast with Paton's advocacy of value-based data for managerial users Hatfield proposed that replacement cost data be provided for investor purposes. Hatfield argued for more realistic numbers, saying that: "the present, and still more the future, is what really interests the investor; the past is dead, and the investment made therein is. . . . of little effect in determining present values or future earnings" (1971, p. 74). During

the 1920's there was some discussion of value accounting in the pages of the Journal of Accountancy. Charles B. Couchman, who was then chairman of the Board of Examiners of the American Institute of Accountants, said that accountants were willing to incorporate appraisal values into the balance sheet (Boer, 1966, p. 94). Another writer said that the problem was not whether to use replacement cost but how to use it safely (Boer, 1966, p. 94).

Despite the theoretical support for value accounting the business community in general stuck to historical cost as the main basis for "valuing" assets. This is well brought out by Solomon Fabricant's 1936 study of 208 randomly selected corporations listed on the New York Stock Exchange. Fabricant discovered, as Boer (1966) notes, "that of 153 corporations incorporated before 1925, only eight had written up their assets in 1925 while 22 had written them down, and in 1928 seventeen corporations had written up their assets, and eighteen had written them down. Certainly a greater number of these 153 corporations in this sample would have reported replacement cost values in their statements if the idea had already gained wide acceptance" (p. 94).

The depression which began in 1929 created new conditions favoring a close adherence to cost as a basis for asset valuation. The tendency, slight as it was, to write-up assets was not only checked but reversed, and write-downs became frequent. As George O. May noted:

> At the same time, particularly in the public utility field, past write-ups--some of which were warranted and others unjustifiable--were being scathingly criticized in the course of a movement to strengthen government controls. In a conference with members of the Federal Trade Commission, following the passage of the Securities Act of 1933, the use to be made of the power granted the Commission to prescribe accounting methods was under discussion. A commissioner dilated on the necessity for stringent rules against the vice of write-ups. I suggested that the necessity had already passed, and that, in private industries at least, the danger was, rather that assets would be unduly written down for purpose of reducing depreciation charges against income. (1943, pp. 94-95)

May's fears were well borne out by the facts. Fabricant in his 1936 study discovered that the number of companies reporting write-downs increased from 49 in 1931 to 64 in 1932. The depression and its aftermath created a political and social climate that favored a cost-based accounting system. The social and economic reformers that arose in the depression wanted to limit the businessman's ability to manipulate his assets, and the conservative restrictions of historical cost were well suited to this purpose. But despite these strong political and social forces May concluded that "perhaps the strongest argument in favor of this procedure [the revaluation of assets] is the <u>difficulty and uncertainty that are encountered in determining value</u>" (1943, p. 102. Emphasis added). May's comments are still applicable today. It seems to us that the main reason why value-based accounting is not in widespread use is because of the <u>practical</u> difficulties involved. We made special

note of these difficulties in chapter 2 where we discussed the conditions necessary for the very existence of a market. Where a market is very thin or nonexistent there is not even the possibility of value accounting.

Public Utility Accounting and the Value Debate

The earliest discussions concerning replacement costs in the United States occured in rate cases heard before public utility regulatory agencies; mainly the Interstate Commerce Commission. The job of the rate-setting commissions was to protect the public against excessive charges while at the same time allowing a fair rate of return to the public utilities. In the process of determining the rate base the choice between historical cost and replacement cost naturally arose. As Boer (1966) points out "the constant decline in the price level from the peak attained near the close of the Civil War to a low reached about the end of the century created a problem for the rate making bodies. This problem arose because most of the railroads operating in the latter half of the nineteenth century were using facilities built in the high price era prevailing near the close of the war between the states" (p. 92). The railroads obviously favored historical cost in determining their rate base while the state regulatory agencies, "with the power to set rates and the duty to see the consumers received railway service at a reasonable price, generally insisted on using the reproduction cost

(replacement cost) in setting up the rate base" (Boer, pp. 92-93).

The Supreme Court entered the controversy in 1898 when it handed down its ruling in Smyth v. Ames. The Court stated that some consideration must be given to the fair value of assets when setting up the rate base. As May (1943) puts it:

> The Court found itself barred by the nature of the issue from requiring value to be computed with reference to earning capacity, which it recognized as being the principal determining factor. It undertook to prescribe a method of computing value by combining a variety of minor elements in undisclosed proportions. The confusion and uncertainty which was produced by the rule then laid down led eventually to a situation in which. . . . the Court came to recognize reproduction cost less allowance for depreciation (which must not be computed by mere formula) as virtually determining value. (pp. 95-96)

Even 40 years after Smyth v. Ames, May (1943) considered that it was debatable whether subsequent cases had caused the Supreme Court to alter its position. Definitely reproduction cost was not universally hailed as "the" measure of value. The main change in the court's position was that it was (in 1940) more ready to look at the realities of the business world when deciding on questions of value.

Postwar Inflation and Historical Cost

The depressed economic conditions of the 1930's came to a rapid end with the rumblings of the Second World War. The increased economic activity was accompanied by a rise

in prices. Boer (1966) indicates that the consumer price index rose from 128.6 in 1945 to 171.9 in 1948 (1935-1939 = 100). This rapid inflation caused new concern over the shortcomings of historical cost. The main worry was with the affect of inflation on reported income. After the war most firms found that they could not replace their assets with the inadequate depreciation allowances built up on the low prewar historical costs. Boer (1966) says that:

> Some companies did deduct additional depreciation charges for depreciation because of the increased price levels. Hercules Powder, for example, deducted additional depreciation charges of $1,322,000 of its 1947 income statement, National Steel Corporation added $3,500,000 to its depreciation expense in 1947 because of the price increases, and in the same year United States Steel charged $26,300,000 against revenue because of higher replacement costs. The thinking of the accounting profession at this time is probably reflected in the actions taken by the auditors of these companies: a qualified auditor's report was given to each of these cases because of the additional charges. (p. 96)

The problem of plant replacement was not only confined to the United States: Great Britain had an even more urgent need to replace its outmoded equipment. A "blue-ribbon" academic committee formed by the Association of Certified and Corporate Accountants wrote in their analysis of the problem that: "The fundamental difficulty in regard to accounting technique is that existing practice tends to disregard changes in price and cost levels in the design or form of accounts. So long as prices and costs, and hence the value of money, remain stable, no problems exist

for replacement costs coincide with historical costs. Once price levels begin to move, whether up or down, replacement costs and original costs begin to diverge and difficulties begin to intrude" (Association of Certified and Corporate Accountants: Taxation and Research Committee, 1952, p. 11). Chambers[1] himself admits that it was the difficulties over the postwar inflation that first got him started on an alternative to historical cost.

The Accounting Profession and Historical Cost in the Postwar Inflationary Era

Despite the rapid rate of inflation and theorists' concern over the inadequacy of depreciation allowances, the accounting profession remained staunchly behind its advocacy of historical cost. In 1953 the American Institute of Certified Public Accountants incorporated its previous views on historical cost into ARB No. 43, a codification of previous Accounting Research Bulletins. The academic accountants, on the other hand, realizing the persistence of the inflationary trend started to face the shortcomings of historical cost, and in 1951 the American Accounting Association's Supplementary Statement No. 2 suggested that historical cost financial statements be supplemented by price-level adjusted financial statements. In their 1957 summary of financial accounting standards they argued even more forcibly for appended price-level adjusted financial statements and further urged that the time had come for their recommendations to be given a thorough test in practice.

In 1962 an important work was published: Sprouse and Moonitz's Accounting Research Study No. 3, "A Tentative Set of Broad Accounting Principles for Business Enterprise." In this study Sprouse and Moonitz argued forcibly for inventories to be recorded at net realizable value if they were readily salable and had predictable disposal values; they also argued that plant and equipment "should be restated in terms of current replacement costs whenever some significant event occurs, such as a reorganization of the business entity or its merger with another entity or when it becomes a subsidiary of a parent company" (p. 57). Even though the American Institute of Certified Public Accountants rejected the study as it advocated too radical a departure from historical cost, they did publish and support the dissemination of the study which showed some willingness to change. The American Accounting Association in: A Statement of Basic Accounting Theory (1966) pointed out that historical costs were primarily useful when verifiability is to be emphasized but that replacement costs were relevant to future decisions. The Association therefore recommended that both current cost and historical cost information be presented in financial statements (pp. 19, 32).

In 1969 the Accounting Principles Board issued Statement No. 3, "Financial Statements Restated for General Price-Level Changes," in which it proposed that price-level adjusted data be presented as supplementary information to financial statements based on historical cost. The

Accounting Principles Board's successor, the Financial Accounting Standards Board (FASB), on December 31, 1974 issued an exposure draft in which it proposed essentially the same thing as APB Statement No. 3, that is, that all entities include supplemental financial statements in units of general purchasing power.

The SEC and Current Values

In the face of the accounting profession's slow and halting progress towards the inclusion of current cost data into financial statements, the Securities and Exchange Commission (SEC) acted to stimulate some changes in this area. In its Accounting Series Release No. 151 (1974) the commission noted that because of the continuing inflation, which ran about 8 percent in 1973 (wholesale prices rose about 16 percent), "the usefulness of the traditional accounting measurement model based upon historical cost is significantly reduced. The process of matching costs against revenues is less likely to produce meaningful economic information if the costs were incurred at a time when the price level associated with such goods and services differed significantly from that at the time when revenues were realized" (p. 1). The SEC stated that the most immediate cause of concern were the illusory "inventory profits" that were caused by the gap between the original purchase price and replacement cost of inventories.

Due to the lack of response to its suggestions for disclosing the effects of price changes on inventories as set forth in ASR No. 151, the SEC issued Release No. 33-5608 where it proposed an amendment to Regulation S-X that would require footnote disclosure of specified replacement cost information. It was proposed in the amendment that, at each fiscal year end, inventories be stated at estimated current replacement cost along with the estimated current cost of replacing the productive capacity of the firm. The amendment also required that cost of goods sold and depreciation expense, based on estimated replacement cost, be disclosed in the footnote too. These proposals were subsequently made official and applicable to large corporations in 1976 with the issuance of ASR No. 190. The SEC has clearly taken the lead in the implementation of current cost figures in financial statements. It's not really a question now of whether replacement cost data should be presented but how it should be presented.

Ijiri: a Modern Day Apologist for Historical Cost

Ijiri (1967, 1971) is nowdays considered by many to be "the leading current academic advocate of historical cost accounting" (Anderson, 1976, p. 13).

Ijiri's first defence of historical cost over market valuations is that historical cost is practical. As Ijiri says: "Among various valuation methods, there is one which is unique in terms of practicality of measurement, i.e.,

the valuation method based on historical costs" (1967, p. 65). A factual causal chain (a means of obtaining and disposing of goods), for Ijiri, "that actually involves $\bar{G}$ [goods that we now possess] has an advantage over other methods in the sense that it is unique and certain" (p. 65).

Historical costs, being unique and certain, avoid two difficulties of market based measures: the multiplicity and instability problems. The multiplicity problem arises because there are many alternate ways that we can obtain G (any good). But only under historical cost can we isolate a unique way of obtaining G. The instability problem concerns the fact that causal networks which were applicable in the past are not expected "to be applicable in the future because of a change in the environment" (1967, p. 63). Market valuations which are by nature ex ante valuations are subject to the instability problem. Another factor which makes market valuations more disputable than historical cost is the non-additivity of market values (Ijiri, 1971, p. 6). Ijiri, goes on, to say that "the historical cost of Resource A and Resource B is by definition the sum of the historical cost of Resource A and Resource B" (1971, p. 6. Emphasis in original). However, the market valuation of Resource A and Resource B together will usually exceed the sum of their separate market values. Also, Ijiri says, "the component-by-component valuation of a plant can be quite different from the valuation of the plant as a whole" (1971, p. 6). Ijiri regards this problem of the level of

aggregation as a serious one, that must be resolved to avoid disputes over market values (p. 7).

The practicality and certaintly of historical cost, Ijiri believes, makes it uniquely qualified to aid in the custodial function of accounting (1971, p. 4). "Actually, the function of accounting in controlling the resources of a firm is the most fundamental one with which acounting began several centuries ago" (Ijiri, 1971, p. 5). Ijiri broadens the custodial function into what he calls equity accounting. Equity accounting entails that accountants "operate an accounting system in the most objective, consistent, and unambiguous manner since the data they provide directly affect the way in which conflicting interests are solved" (1967, p. 67). The data produced under Ijiri's equity accounting system are less important than the fact that interested parties can trust accountants that their system is operating properly (1971, p. 8).

A final advantage that historical cost data have over market values is that they are useful for managerial decision making. Under a historical cost system accountants can easily expand the dimensions of the data set they present to management (1971, p. 11). Also the stability of the historical cost data may lead to better extrapolations.

Notes

1. Chambers' comment was made in a classroom lecture at the University of Sydney, Sydney, Australia, Third Term, 1967.

CONCLUSION

The initial impetus for this dissertation was the belief that a thorough analysis of the notion of capital maintenance would offer valuable insights into the asset valuation problem--and this belief was largely vindicated. We approached capital maintenance through the works of F. A. Hayek (1935, 1969). Hayek saw asset valuation as part of the process of determining income. He said income was earned only after capital was maintained. Income is not to be seen as some absolute, inviolable amount to be received each year, but rather as a constant flow to be received each year. Hayek saw that in an uncertain world a notion of income that ignored unexpected and dramatic shifts in the productive capacity of firms (and even whole communities) was badly deficient.

Hayek saw capital as a subjective amount; always contingent upon future events and thus always subject to reassessment. Accordingly, he was very sympathetic to practitioners employing simple substitutes (generally historical cost) to the subjective assessments of entrepreneurs. However, although Hayek allowed historical cost as a convenient substitute for subjective value he made it quite clear that when circumstances unexpectedly changed

historical cost did not give a good measure of capital value. In fact he challenged accountants to tackle the problem of arriving at a better measure of capital where possible.

Two of the key characteristics of a suitable surrogate of subjectively valued capital are that it continuously captures expectations concerning the future, and that it measures the value of the asset in use. A measure that to a certain extent embody's these characteristics is the market value of an asset. It might at first seem that what is obviously wanted is the used market price of the asset, but this is not always the case. We must first point out that there are different types of assets. We will classify assets into two general types: the first category contains assets that are firm-specific and immobile; the second category contains assets that are general purpose and mobile. The used market (both buying and selling) for firm-specific, immobile assets is very weak, while the used market for general purpose, mobile assets is often quite strong. The conclusions that one can draw about asset valuations ultimately depend upon which type of asset one has in mind. Thus a useful way of categorizing modern day accounting theorists is in terms of the presumptions they have about the relative importance of the two types of assets.

The first accounting theorists that we discuss are Edwards and Bell. Edwards and Bell's approach to asset valuation is predicated upon the premise that the most

important class of assets to value are the firm-specific immobile assets. We share their presumption. Edwards and Bell feel that the used market price of a firm-specific asset (which they call the asset's opportunity cost) is in most instances little more than a scrap value and so of little use in determining the value of the asset in use to the firm. Rather than employ used market values E&B advocate that assets be valued at their replacement cost (entry price).

They advocate that the used replacement price be estimated from the replacement price of a new similar asset. In this way they avoid the pitfalls of valuing an asset at its scrap value. Perhaps E&B could use a used market price rather than adjust a new asset price for estimated wear and tear where the asset in question was actively traded in a secondhand market? Where the asset was mobile and general purpose they could obtain an eminently suitable value by going to the used asset market. It should be noted that E&B at all times are attempting to value the used value of the asset and are not concerned with the new cost of the latest, best technology asset.

A problem attendant upon their estimating procedure is that it is often difficult to estimate the used price of an asset from the new asset price. This is especially so when the asset in use is no longer produced. Edwards and Bell are perhaps at their weakest in treating this case. They center their discussion on the possibilities of using index

numbers and appraisals. Unfortunately they never really come to grips with the problem. Wright, another accounting theorist, is better in this regard. Wright posits a system where you attempt to compare assets in terms of the "equivalent services" that they perform. If the new asset gives twice the output of equivalent services of the old, outmoded asset, then the old asset would be valued at half the cost of the new, less an allowance for wear and tear. Wright's notion of equivalent services would be quite satisfactory where the outputs of the new and old machine were not qualitatively different. His idea would be most suitable where the assets performed a largely mechanical, engineering function. Where the assets give direct services to human beings qualitative differences could be crucial.

In regard to this problem of estimating the used asset price from the price of new assets we can say that there is still work to be done. And while E&B did not go very far in their discussion of this problem they at least did not fall into the trap of recommending that a best technology measure be used (which the SEC appears to be doing), nor did they recommend that a simple reproduction cost be used. Wright's notion of equivalent services is a conceptually valid way of approximating the current replacement cost of a used asset by using the new price of the best technology substitute. Whether Wright's notion of equivalent services is practically feasible is not so obvious. We believe that

E&B have made what is still the most complete attempt to formulate a market based competitor to historical cost accounting and accordingly deserve due recognition.

Edwards and Bell not only present their arguments on a highly abstract level; they also point out some of the practical decision-specific reasons why their system would benefit users of accounting data. Their arguments largely turn on the distinction that replacement cost values enable you to make between operating activities and holding activities. A holding gain occurs simply because of the passage of time. If you can distinquish between holding gains and losses and operating gains and losses then you can avoid some of the problems associated with historical cost data. One such problem concerns the fact that two firms which are not operating at the same level of efficiency may be judged under historical cost standards to be of equal efficiency. The misconception can arise because one of the firms will have been more wise (or lucky) in the timing of the purchase of its assets: it purchases them at a lower price. The luckier firm would then charge a smaller amount of depreciation against current revenues than the second firm. Thus while the second firm is more efficient they both will appear to be operating at the same level of efficiency because the first firm is treating some of its holding gain as operating income.

We saw in chapter 3 that E&B's holding versus operating dichotomy is not always useful. Interestingly enough

the usefulness of their division turns, as is the case with their asset valuation scheme, on the type of asset under discussion. In the case of inventories, for instance, we saw that the inclusion of inventory holding gains in net income could very easily lead to the unintentional distribution of too many resources. A firm could, following E&B's accounting scheme, find itself unable to replace its inventory after it made a sale. On the other hand the recognition of holding gains on investment assets does present useful information to statement users. The statement user is informed of the asset appreciation under E&B's scheme whereas this information is omitted under the historical cost system.

The next accounting theorist that we treat is R. J. Chambers. Chambers differs from E&B in that he advocates that exit values (selling prices) be used to value assets. Chambers therefore must regard general purpose, mobile assets as being of prime importance. We say Chambers "must regard" rather than he originally did regard these types of assets as being of prime importance, because we believe that Chambers' conclusions follow basically from a faulty notion of business behavior rather than from any special preference for asset types.

Chambers' accounting model is based upon the proposition that business organizations act (or should act) like biological homeostatic systems (self-regulating systems). The homeostatic (adaptive) system has some plausibility for treating an individual as an investor, but, we feel, has

little plausibility for treating the business entity as producer. Chambers presents a scenario where the firm is constantly evaluating the decision whether it should liquidate its present venture and invest in an entirely new venture. Such a possibility requires that it know the maximum resources that it would receive for its present assets if it sold them all. Most accountants intuitively reject Chambers' scenario, and so do we. We believe that the firm is not always on the threshold of liquidating its current productive setup; rather, at any given time it is probably solidly locked-in to its given production.

Once Chambers has accepted the thesis that firms are adaptive mechanisms he has to argue that the logical market measure is the resale (exit) value of its assets. He calls this measure, its current cash equivalent. Needless to say Chambers runs into difficulty as soon as he treats firm-specific, plant assets (which he calls durable assets). He does at least admit that these assets might very well have no current cash equivalent (i.e., only have a zero scrap value). However, he retreats from this position somewhat and suggests that perhaps some sort of index number be devised, or perhaps some entry value be used as a <u>surrogate</u> for the exit value. He offers little support for his views here, and offers no support as to why entry values would be suitable surrogate for exit values. Paradixically, when the asset is almost worthless, say because of technical obsolescence, Chambers starts to recommend

that perhaps entry values are what is needed while E&B recommend that exit values are appropriate in this case.

It should be noted that Chambers' accounting system has some validity for the mobile, general use asset case. McKeown has proved that for at least some firms Chambers' system is feasible. In conclusion we feel that, despite the elegance of his arguments, Chambers' accounting system is of only very limited applicability, and we also feel that it is therefore definitely inferior to E&B's accounting system.

A valuation system advocated by Solomons (1966, 1971) and others, "Value to the Owner," does keep the fact that an asset is purchased to be used uppermost in mind. The value to the owner system of valuation consists of six decision rules which involve possible relationships between present value (PV), replacement cost (RC), and net realizable value (NRV) (exit value). The most likely relationship for a large, expensive, firm-specific asset would be where PV > RC > NRV. Whereas, for inventories, the following relationship would be more likely: PV > NRV > RC. The main benefit of the value to the owner scheme is that it allows for the situation where an asset is used or where it is to be scrapped--and so presents a realistic, common sense valuation.

The value to the owner set of decision rules is not supposed to be a general treatise on market values. It says that where an asset is being used replacement cost is

generally applicable, but when the asset is about to be scrapped, exit values are what is wanted. Most value to the owner advocates argue that replacement costs would be used in the vast majority of cases, especially in regard to plant assets. It is interesting to note that Edwards himself (of Edwards and Bell) in a recent reappraisal of his and Bell's ideas spoke quite favorably of the value to the owner scheme (Edwards, 1975, p. 240).

In the final chapter of this dissertation we dealt with historical cost. We treated it in two ways, first we looked at a historical development of historical cost, and second we treated the arguments of a modern day apologist for historical cost: Ijiri. Ijiri defends historical cost on the grounds that they are extremely useful for custodial purposes, that is, they help society in that they help resolve disputes. While we agree with Ijiri's general argument we believe that under, say, a scheme like E&B's not only would we have the benefits of historical cost but we would have many other benefits besides. As a final comment we feel that George O. May's reason as to why market values weren't more widely used by businessmen in the 1930's is instructive. May said that the strongest argument in favor of using historical cost is "the difficulty and uncertainty that are encountered in determining value" (1943, p. 102). There is still a lot of truth in what May says.

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BIOGRAPHICAL SKETCH

Brian Anthony O'Doherty was born January 20, 1948, in Sydney, Australia. In 1964, he was graduated from St. Joseph's College, Hunter's Hill. In March, 1968, he received the degree of Bachelor of Economics from the University of Sydney. From January until July, 1968, he was employed in Sydney by Peat, Marwich, Mitchell & Co., a firm of chartered accountants. He enrolled in the Graduate School of the University of Florida in September, 1968, and received the degree of Master of Arts (majoring in accounting) in August, 1970. After graduating from Florida he worked for 3 years with the University of Maryland, Overseas Program, European Division, teaching accounting and business administration courses in England, Greece, West Germany, and Italy. He returned to the University of Florida in January, 1974, to begin work on a PhD degree and has pursued this goal to the present time.

Brian Anthony O'Doherty is married to the former Eliza Vasmatzian; they have no children but expect one in July.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

E. Dan Smith, Chairman
Associate Professor of Accounting

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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